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PROCEEDINGS

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1878.

DESCRIPTIONS OF NEW FORMS OF MOLLUSKS FROM ALASKA CONTAINED IN THE COLLECTIONS OF THE NATIONAL MUSEUM.

By W. H. DALL.

CHITONIDÆ.

Genus AMICULA Gray.

Type *A. vestita* Sowerby.

Subgenus CHLAMYDOCHITON Dall.

Ch. t. '*Amiculæ*' similiter sed branchiæ ambientes.

Type *Chiton amiculatus* Pallas.

Amicula proper has the branchiæ median.

Genus LEPTOCHITON Gray.

Leptochiton Belknapi Dall, n. s.

L. t. elongatâ, valde elevatâ, dorsualiter angulatâ; albidâ plus minusve cinereo et nigro tinctâ; valvis elevatis, apicibus distinctis; mucrone centrali conspicuo; sculptura ut in *L. alveolo*, sed granulis in areis dorsualis sparsim et quincuncialiter dispositis; valva postica sub apice concava, posticè sinuatâ; zona minimâ spiculis tenuibus versus marginem munitâ. Lon. 10, lat. 3mm. Div. 90°.

Hab.—North Pacific Ocean, in lat. 53° 08′ N., and lon. 171° 19′ W., at a depth of 1006 fathoms, black sand and shells. Brought up in the sounding-cup, on the sounding expedition of the United States ship Tuscarora, Capt. George E. Belknap, U. S. N., in 1874.

This specimen comes from a greater depth than any specimen of the order hitherto collected. It is nearest to *L. alveolus* Sars, from the coast of Norway.

Genus TRACHYDERMON Cpr.

Subgenus TRACHYRADSIA Cpr. (Ms.).

Trachydermon, valvis centralibus bi- seu pluri-fissatis.

Type *Chiton fulgetrum* Reeve.

Trachyradsia aleutica Dall, n. s.

T. t. parvâ, rufo-cinereâ, oblongâ, fornicatâ; jugo acutissimo; mucrone

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submediano, apicibus prominentibus; areis lateralis inconspicuis; totâ superficie quincuncialiter minute reticulatâ; *intus*, valv. ant. 16-, post. 11-, centr. 2-fissatis; dent. parvis, perspongiosis, late separatis; subgrundis spongiosis, curtis; sinu parvo; *zona* squamulis minutis obsitâ. Lon. 6, lat. 3mm.

Hab.—Western Aleutians, near low-water mark; Dall.

This bears no marked resemblance to any of the other Alaskan species.

Genus TONICELLA Cpr.

Type *Chiton marmoreus* Fabr.

Tonicella saccharina Dall, n. s.

T. t. parvâ, oblongâ, totâ superficie saccharina, rufo et albescente pictâ; mucrone submediano, inconspicuo; areis lateralis inconspicue elevatis, albescentis; areis dorsualis sanguinosis, æque quincuncialiter lente reticulatis; v. ant. 10–11-, v. post. 8–10-, v. centr. 1 fissatis; dent. parvis spongiosis, sinu parvo; subgrundis spongiosis, mediocris; zonâ coriaceâ ut in *Tonicellæ* aliis: branchiæ mediæ. Lon. 6.5, lat. 4mm.

Hab.—Aleutian Islands, three to thirteen fathoms; Dall.

This species has the lustre of rock-candy, and is well marked by the contrast of the white lateral with the red dorsal areas.

Genus SCHIZOPLAX Dall.

Testa et zona *Tonicellæ* simulans; valvæ centrales sulco jugali mediano, antico argute incisæ; branchiæ subambientes.

Type *Chiton Brandtii* Midd.

For this remarkable Alaskan form, distinguished from all other Chitons by its slit central valves, I propose to adopt a name suggested by Dr. Carpenter, who, on Middendorf's figures, had intended to propose it as a subgenus of *Tonicella*. The specimens obtained by my party seem to be the first found since the original ones were obtained. A careful examination of the soft parts shows that in dentition and some other details sufficient basis for generic separation is found, confirming the testimony of the valve characters. The sulcus is usually filled by a horny or cartilaginous deposit.

It may be added here that investigation of the characters of the radula in numerous species and genera of Chitons in the National Museum shows a very remarkable uniformity of dentition. No larger groups than genera are indicated in the whole order, which, it appears, can hardly comprise more than one family; and it is doubtful if this can be divided into subfamilies by any characters yet elucidated.

The dentition in all species examined has the formula $6 \cdot 2 \cdot 1 \cdot 2 \cdot 6$, or $\frac{1}{8 \times 8}$. Of the teeth, the rhachidian appears always simply cusped;

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the two laterals present varied characters; the third uncinus, counting outward, is usually spatulate; while the remainder are mere bosses, or scales. The wide differences found in the few figures of the dentition of Chitons extant appear to be due to erroneous interpretation of the objects represented. The figures of Lovèn are the most satisfactory.

POSTPLIOCENE FOSSILS IN THE COAST RANGE OF CALIFORNIA.

By W. H. DALL.

The National Museum has received from Mr. G. F. Merriam, of San Luis Rey, Cal., specimens of *Donax californicus*, *Chione succincta*, *Olivella biplicata*, and *Cerithidea sacrata*, in a semi-fossilized condition. The first mentioned retained a considerable part of its pinkish interior coloration. These fossils (probably with other species) are stated by Mr. Merriam to be found in great abundance at the head of a cañon in that vicinity, in the heart of the Coast Range, twelve miles from the sea in a direct line, and six hundred feet above tide-water. All the species are found living in abundance on the present sea-coast. This indicates a very recent elevation for this part of the coast, if the facts are correctly interpreted, and further specimens and details will be awaited with interest.

NOTES ON THE AMERICAN SPECIES OF THE GENUS CYBIUM.

By FELIPE POEY.

[Translated by G. BROWN GOODE, from MS. memorandum of Professor FELIPE POEY.]

Cybium caballa, Cuv. & Val.

Cybium caballa, CUVIER & VALENCIENNES, Histoire Naturelle des Poissons, viii, 1831, p. 187.—GÜNTHER, Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum, ii, 1860, p. 373.—POEY, Repertorio Fisico-Natural de la Isla de Cuba, i, 1867, p. 322; ii, p. 13; and in Synopsis Piscium Cubensium, *op. cit.*, ii, p. 362.

Cybium acervum, CUVIER & VALENCIENNES, *loc. cit.*, p. 186 (*nec typus*).

Vulgo:—*Sierra.*

Differential Characters.—First dorsal with fourteen spines, without a black spot anteriorly. Body immaculate in the adult, spotted with yellowish in the young fish.

The number of teeth increases with the age; in large specimens, it is $\frac{20}{22}$. The larger teeth are placed upon the middle of the jaw, those in the lower jaw being a trifle the longer. The lateral line is very sinuous upon the posterior portion of the body. The eye is larger than in *Cybium regale.*

Bluish upon the back, whitish under the belly. First dorsal white; second dorsal and caudal dusky-bluish (*bleu-noirâtre*); pectorals bluish, as is also the anal, which, however, becomes white at its extremity; ventrals whitish.

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In the young fish, under the length of two or three feet, the sides are covered with round, irregular spots, of rather dirty yellow (*jaune un peu sale*).

Cuvier described a specimen which weighed twenty-two pounds; at that size, the fish is still young, and retains its yellow spots.

Those ordinarily taken range in weight from twelve to twenty-five pounds, though they reach the weight of one hundred pounds. I have seen one which measured 285mm.

Cybium regale, (Bloch) Cuvier.

Scomber regalis, BLOCH, Naturgeschichte der ausländischen Fische, taf. 333.

Cybium regale, CUVIER & VALENCIENNES, *op. cit.*, p. 184.—GÜNTHER, *op. cit.*, p. 372.—POEY, *op. cit.*, i, p. 322; ii, p. 362.

Vulgo:—*Pintada.*

Differential Characters.—The first dorsal has seventeen spines and the spot upon its anterior portion. The lateral bands and spots are persistent through life.

The teeth are $\frac{2}{1}\frac{0}{6}$ in a specimen of moderate size. In the upper jaw, the median teeth are the larger; in the lower, their size is more nearly equal.

The back is bluish, as are also the top of the head, the second dorsal and its finlets, the caudal, and the pectorals. The first dorsal is white, having in front a spot of deep-blue, which is prolonged far back upon the upper edge of the fin. The anal and the ventrals are white. The sides are sky-blue, with silvery lustre; the belly is white, with a bluish tinge. The sides are marked with broken longitudinal bands and round spots; these bands and spots are yellow, more or less golden, and with a reddish tint.

The ordinary size is about twelve pounds, though they sometimes reach the weight of twenty.

Cybium acervum, Cuv. & Val.

Cybium acervum, CUVIER & VALENCIENNES, *op. cit.*, p. 186.

The specimens described by Cuvier were of five pounds weight. He claims to have received specimens from Martinique, from Santo Domingo, and from Cuba, those from the latter place sent by me. I can only say that I have not been able to find this species, and that I have not included it in my manuscript "Ichthyologie".

According to Cuvier, it has seventeen spines in the first dorsal, and also the black spot. The body is immaculate, even in the specimens of five pounds weight.

Cybium maculatum, (Mitchill) Agassiz.

Scomber maculatus, MITCHILL, Transactions of the Literary and Philosophical Society of New York, i, 1815, p. 426, pl. vi, fig. 8.

Cybium maculatum, AGASSIZ, in Spix, Selecta Genera et Species Piscium, 1829, p. 103, tab. lx.—CUVIER & VALENCIENNES, *op. cit.*, p. 181.—GÜNTHER, *op. cit.*, p. 372.

The *Cybium maculatum* of the United States has the teeth somewhat conical and very pointed. It has seventeen dorsal spines and a black spot upon the first dorsal.

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Cybium immaculatum, Cuv. & Val.

Cybium immaculatum, CUVIER & VALENCIENNES, *op. cit.*, p. 191.—GÜNTHER, *op. cit.*, p. 370, note 5.

The *Cybium immaculatum* of Cuvier has the body immaculate in specimens only six or seven inches long.

Acanthocybium peto, Poey.

Acanthocybium Petus, POEY, Memorias sobre la Historia Natural de la Isla de Cuba, ii, 1860, p. 234, pl. xvi, fig. 1; Repert., ii, p. 363.
Vulgo:—*Peto*.

This genus differs from *Cybium* by its numerous dorsal spines, twenty-five in number. The type taken by Professor Gill has the teeth compressed, triangular. The Cuban species has the points of the teeth rounded. The caudal is very small. The lower jaw has its sides deeply notched and its extremity lower than its lateral edges. In specimens of less than three feet, the body is covered with vertical bands of a vitreous lustre (*glacées*). It grows very large, sometimes attaining the weight of one hundred pounds.

THE CLUPEA TYRANNUS OF LATROBE.

By G. BROWN GOODE.

Mr. Benjamin H. Latrobe, a surveyor of public lands, published, in 1802, a description of a clupeoid fish the affinities of which have never been satisfactorily determined.* Dr. DeKay, misled by the name "alewife", applied the specific name *tyrannus* to the northern species known to him by that popular name (*Pomolobus pseudo-harengus*), a usage which was concurred in by Dr. Storer and M. Valenciennes. In his earlier writings, Professor Gill referred the same name to the shad (*Alosa sapidissima*). Latrobe's paper, and the name therein proposed, have lately been lost sight of; but there is little doubt that they refer to the menhaden, or mossbunker (*Clupea menhaden*, Mitchill, and *Brevoortia menhaden*, Gill). The laws of priority demand that this species shall henceforth be designated *Brevoortia tyrannus*.

The fishes of the Chesapeake and its tributaries have been very little studied until within the past three years, and the habits of the menhaden are so different in these waters and in the north that it does not seem surprising for Northern ichthyologists to have made mistaken identification of Latrobe's specific name.

A few years ago the Capes of Delaware were thought to define the southern range of the menhaden, while its peculiar parasite and its habit of ascending southern rivers were unknown.

*A Drawing and Description of the *Clupea tyrannus* and *Oniscus prægustator*. By Benjamin H. Latrobe, F. A. P. S. <Transactions of the American Philosophical Society held at Philadelphia for promoting useful knowledge, vol. v, 1802, p. 77.

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I shall soon publish a full discussion of this subject. At present, my conclusions may be stated as follows:—

(1) The figure, while undeniably bad, resembles the menhaden very closely, while it cannot be intended to represent any allied species. The contour, were the missing dorsal fin supplied, is similar to that of the menhaden. The black spot upon the scapular region is constant in the menhaden only, though a similar one is occasionally seen upon the shad and alewife.

(2) The name "bay alewife" is the same now given to the menhaden in the Chesapeake and its tributaries. This is a strong argument: for although seventy-five years have passed since Latrobe wrote, the persistence of popular names is very remarkable, as I have elsewhere pointed out.* Moreover, Latrobe was also acquainted with a "herring" and a "shad". These being eliminated, there is no other fish than the menhaden to which the description in question can refer.

(3) The habits of the alewife, as described by Latrobe, are essentially the same as those of the menhaden at the present day. The alleged river-ascending habits of the "bay alewife" were thought to throw its identity with the menhaden out of the question. This is no longer an obstacle.

(4) The presence of the crustacean parasite is the strongest argument of all. While this is found in the mouths of a large percentage of the southern menhaden, suggesting the local name of "bug fish", it has never once been found attached to any other species, although careful search has been made by several persons. The northern menhaden is free from this parasite. This is still another reason for the failure to identify on the part of northern writers.

Latrobe's name has the priority over Mitchill's by thirteen years. It is to be regretted that it is necessary to replace by another a name so, appropriate and of such long standing.

JANUARY 1, 1878.

THE OCCURRENCE OF BELONE LATIMANUS IN BUZZARD'S BAY, MASSACHUSETTS.

By G. BROWN GOODE.

A peculiar species of *Belone* was obtained at Wood's Holl, in 1875, by Professor Baird. It was caught in the weir on Great Neck, owned by the Wood's Holl Weir Company. On study, it proved to be the form described by Professor Poey under the name *Belone latimanus*, and hitherto known only from Cuba. A good water-color sketch (Cat. No. 795) was made by Mr. Richard, a photograph (Cat. No. 218) taken, and the specimen and a finely colored cast (Cat. No. 16121) are preserved in the National Museum.

*Catalogue of the Fishes of the Bermudas, 1876, p. 15.

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It may be distinguished from the common species of our coast, *Belone longirostris*, (Mitchill) Gill, by many characters, the most salient of which are the more elongate form, the lesser proportionate length of the head, the much greater number of rays in the vertical fins (*B. latimanus* has D. 25: A. 23. *B. longirostris* has D. 13–16: A. 16–19), the broader and proportionately shorter pectorals, and the forked caudal.

The length of the specimen was 49 inches (1244.6 millimetres), its weight 5¼ pounds (2381 grams).

COLOR:—Back, top of head, and snout dark green in dead specimen, probably beryl-green in life. Fin-rays greenish-brown. Fin-membranes and protected parts, such as axils of pectoral fins, colorless. Sides light brownish, with silvery overwash. Belly, cheeks, throat, and lower part of lower jaw silvery-white. Eye greenish-yellow.

Radial formula.—Branchiostegals XIV. D. 24: A. 25: C. 7–6 + 7–5: P. 12: V. 6.

JANUARY 15, 1878.

THE VOICES OF CRUSTACEANS.

By G. BROWN GOODE.

The observations of Mr. Saville Kent and Mr. J. Wood Mason (NATURE, vols. xvi, p. 565, and xvii, p. 11) recall to mind some similar facts recently noted by me in the Bermudas.

Several species of *Alpheus* were observed to have the power of producing loud clicking sounds. Two or three of the larger species are accustomed to lurk under flat stones near low-water mark. Some of these are two inches long. When one of them is taken between the fingers by an inexperienced collector, the sudden, convulsive snap almost invariably causes him to drop it. The effect is like that of a sharp blow across the knuckles. Some smaller species of the genus are found only in the cavities of a large aplysine sponge, abundant on the reefs. I have picked out seventy or eighty from a fragment of sponge not more than three inches in diameter. When the sponge is taken in the hand, the quick succession of clickings reminds one of the sound of instruments in a large telegraph office. When one of these animals is put in an earthen or glass vessel, it makes a much louder noise, resembling a quick tap with the finger-nail or the back of a knife upon the edge of the same vessel. This noise is produced by a convulsive snapping of the last joint of the large claw, by a movement resembling that of the spring beetles (*Elateridæ*), and the sounds are quite similar. Possibly these movements may have a protective object, enabling the little decapods to escape from the grasp of enemies, or to work out from under the stones and loose sand in which they must often become buried.

Another macrurous crustacean, *Gonodactylus chiragra*, known to the

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Bermudians as the "split-thumb", from its power of wounding by a sharp appendage of the larger claws, produces a viciously sharp, snapping noise, apparently in the same manner with *Alpheus*.

The "Bermuda lobster" (*Panulirus americanus* M. Edw.) makes a loud grating noise. Mr. Kent describes the voice of the allied species (*Palinurus quadricornis*) as being produced by the rubbing together of the spinous abdominal segments. In the species observed by me, the sound was produced by means of certain modifications of the lower joints of the antennæ. There is at the base of each antenna, upon the anterior part of the cephalo-thorax, a broad elevated ridge, parallel with the axis of the body, which in an adult of eighteen inches would be about two inches long. The rounded crests of these ridges are closely embraced by processes from the sides of the basal antennal segments. The profile of each ridge describes the segment of a circle, the centre of which is the centre of articulation of its accompanying antenna. When the antennæ are moved forward and backward, their tips waving over the back of the animal, the close contact of the hard, smooth, chitinous surfaces produces a shrill, harsh stridulation, like the sound of filing a saw. I have never heard the noise when the animals were under water, though I have seen them waving their antennæ. I have no doubt that they can thus produce vibrations perceptible to their mates at great distances, especially if their other senses are as acute as that of smell, which I have tested in a very curious manner. Both sexes are provided with the vocal organs.

DECEMBER 25, 1877.

ON A NEW HUMMING BIRD (ATTHIS ELLIOTI) FROM GUATEMALA.

By ROBERT RIDGWAY.

Having had occasion, recently, to examine some specimens of Humming Birds, I happened to notice certain striking differences between two examples labelled "*Atthis heloisæ*"—one from Guatemala, belonging to Mr. D. G. Elliot, the other a Mexican specimen, in my own collection, obtained from M. Boucard. The differences observed between these were so obvious that I immediately inspected the series contained in the collection of the National Museum, and on comparison found them repeated in the specimens contained therein, including two males from Jalapa and one from the Volcan de Fuego, Guatemala. The former of course represent the true *A. heloisæ*, being from the locality whence the types of that species were procured, and with them my Mexican example agrees in all essential particulars. Both the Guatemalan specimens, however, are very different from any of these, and undoubtedly represent a distinct species, which being, so far as I have been able to ascertain, hitherto unnamed, I propose to characterize as follows:—

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ATTHIS ELLIOTI.

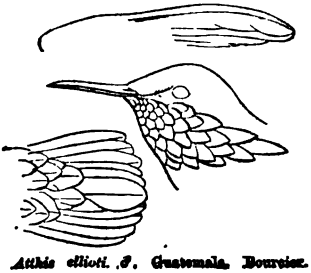
"*Selasphorus heloisæ*", Scl. & Salv., Ibis, i, 1859, 129 (Guatemala); *ib.* 1860, 195 (Dueñas, Guatemala).—Salvin, *ib.* 266 (Guatemala; Tierra Caliente, and slopes of Volcan de Fuego).

"*Atthis heloisa*", B. B. & R., Hist. N. Am. B. ii, 1874, 405 (part: Guatemala references).

Specific Characters.—Adult male:—Outer primary broad, the end not attenuated. Gorget uniform reddish-purple (much as in *Calypte annæ*), without varying tints of violet, as in *A. heloisæ*. Jugulum wholly white; middle of the abdomen white; sides light rufous, slightly glossed with golden-green; crissum white, tinged with light rufous. Upper parts metallic-green, decidedly less golden than in *A. heloisæ*. Tail with the basal half (approximately) bright cinnamon-rufous, the subterminal portion black; three outer feathers (on each side) tipped with rusty-white; the middle pair with the black portion above glossed with metallic-green anteriorly. Wings uniform dusky, the smaller coverts metallic-green. Wing, 1.35; tail, 1.00–1.05; culmen, 0.38–0.40. [Type, No. 20494, ♂ ad., Coll. U. S. Nat. Mus., Volcan de Fuego, Guatemala.]

With a very close general resemblance to *A heloisæ*, this species may be immediately distinguished by the very different form of the outer primary, the redder and more uniform color of the throat-gorget, and the shorter bill. The peculiar characters of the two may be contrasted as follows:—

Atthis heloisa ♂. Jalapa. Dr. Hoermann.



Atthis elliotí ♂. Guatemala. Bourcier.

A. elliotí.

Outer primary broad, the end not attenuated. Gorget uniform purplish-red, without varying violaceous tints. Wing, 1.35; tail, 1.00–1.05; culmen, 0.38–0.40.

Hab.—Guatemala.

A. heloisæ.

Outer primary very narrow, the end abruptly attenuated. Gorget reddish-violet, showing decided violet tints in certain lights. Wing, 1.30–1.50; tail, 0.95–1.10; culmen, 0.48–0.50.

Hab.—Eastern Mexico.

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The principal synonymy and characters of *A. heloisæ* are as follows:—

ATTHIS HELOISÆ.

Ornismya heloisæ, LESS. & DELATTR., Rev. Zool. 1839, 15 (Jalapa and Quatepu, S. E. Mexico).

Mellisuga heloisæ, GRAY, Gen. B. i, 1849, 113, sp. 62.

Tryphæna heloisæ, BONAP., Rev. et Mag. Zool. 1854, 257.

Selasphorus heloisæ, GOULD, Monog. Trochilid. iii, 1852, pl. 141.

Atthis heloisæ, REICHENB., J. f. O. 1853, App., 12.—GOULD, Introd. Trochilid. 8vo ed. 1861, 89.—ELLIOT, Illustr. Am. B. i, 1869, pl. —.—COOPER, Orn. Cal. i, 1870, 361 (El Paso, Texas; Mexico).—B. B. & R., Hist. N. Am. B. ii, 1874, 465, pl. 47, fig. 6 (El Paso, Texas; Mexico).

Specific Characters.—Adult male:—Outer primary very narrow, the end abruptly attenuated. Gorget violet-purple, with changeable tints in varying lights. Jugulum wholly white; middle of the abdomen white; sides light rufous, slightly glossed with golden-green; crissum white, tinged with light rufous. Upper parts metallic golden-green, more bronzy than in *A. ellioti*. Tail with the basal half (approximately) clear cinnamon-rufous, the subterminal portion black, with the three outer feathers (on each side) tipped with rusty-white; middle pair of feathers glossed with golden-green on the upper surface to the extreme tip. Wings uniform dusky, the smaller coverts golden-green. Wing, 1.30–1.50; tail, 0.95–0.10; culmen, 0.48–0.50.

Of the three adult males of *A. heloisæ* now before me, the two from Jalapa are much alike; but that in my own collection, which is evidently from another part of Mexico, although, unfortunately, the precise locality is not stated on the label, differs in several very noticeable particulars. The bill is very much more slender, the wing shorter (about 1.30, instead of 1.50), and the general size decidedly less. What is most conspicuous, however, is the fact that the lateral feathers of the gorget are not elongated as in the Jalapa specimens, in which they are 0.25 to 0.30 of an inch longer than the longest feathers of the middle portion, while there is a mixture of bluish-violet in the gorget not observable in the other specimens. It is barely possible that the longer lateral plumes of the gorget have been lost from this specimen; but in any event, the differences are quite sufficient to characterize a well-marked local race.

JANUARY 29, 1878.

FOSSIL MOLLUSKS FROM LATER TERTIARIES OF CALIFORNIA.

By W. H. DALL.

The National Museum has recently received from Mr. Henry Hemphill a series of fossil shells collected by him from the later Tertiary deposits of the Californian coast. Some of them are from the vicinity of Santa Barbara, but the majority are from San Diego, part of them

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(marked *w* in the list) from the material obtained in sinking a well* at a distance of from ninety to one hundred and sixty feet below the surface of the earth, and not far from the present sea-level. The matrix is usually rather soft, composed of loosely aggregated grains of sand or fine sandy mud, occasionally hardened by infiltration of lime-bearing water.

In the accompanying list, those species found living (R) at the present day in the fauna of the Californian coast, between San Francisco and San Diego, are marked L, those at present making part of the northern or Oregonian fauna N, and those belonging to the fauna of Lower California, the Gulf of California, Mexico, and Central America are marked S. The extinct species (F) form a very small proportion of the whole, as will be readily seen.

7907	*Laqueus californicus* (Koch) Dall	San Diego.	R	N, L
8	*Pholadidea ovoidea* Gld	"	R	N, L
9	*Corbula luteola* Cpr	"	R	L
7910	*Periploma argentaria* Conr	"	R	L, S
1	*Solecurtus californianus* Conr	"	R	L, S
2	*Macoma secta* Conr	"	R	L
3	*Macoma indentata* Cpr	"	R	L
4	*Macoma nasuta* Conr	"	R	N, L
5	*Macoma* (like) *sabulosa* Spengler	"	R	N
6	*Tellina modesta* Cpr	"	R	L
7	*Tellina Bodegensis* Hds	"	R	L
8	*Cumingia californica* Conr	"	R	L
9	*Donax flexuosus* Gld	"	R	L, S
7920	*Mactra californica* Conr	"	R	L
1	*Mactra falcata* Gld	"	R	N, L?
2	*Clementia subdiaphana* Cpr	"	R	N, L
3	*Chione simillima* Sby	"	R	L, S
4	*Chione succincta* Val	"	R	L. S
5	*Dosinia ponderosa* Gray	"	R	S
6	*Tapes staminea* Conr	"	R	N, L
7	*Saxidomus aratus* (jun.) Gld	"	R	L
8	*Petricola pholadiformis?* Lam	"	R	.
9	*Cardium procerum* Sby	"	R	S
7930	*Venericardia monilicosta* Gabb	" *w.*	R	L
1	*Venericardia monilicosta* Gabb	Santa Barbara.	R	L
2	*Lucina Nuttallii* Conr	San Diego.	R	L
3	*Lucina acutilineata* Conr	"	R	N, L
4	*Arca microdonta* Conr	" *w.*	F	.
5	*Axinea profunda* Dall, n. s	"	F	.
6	*Nucula exigua* Sby	"	R	S
7	*Leda cælata* Hds	" *w.*	R	L, S
8	*Pecten islandicus* Mull	"	R	N
9	*Pecten hericeus* Gld	"	R	N
7940	*Pecten ventricosus* Sby. (var. ?)	"	R	S
1	*Pecten expansus* Dall, n. s	"	F	.
2	*Pecten Stearnsii* Dall, n. s	"	F	.
3	*Pecten Hemphillii* Dall, n. s	"	F	.
4	*Pecten? aequisulcatus* Cpr. var	"	R	L, S
5	*Pecten? pauciostatus* Cpr. jun	"	R	L, S
6	*Janira dentata* Sby	" *w.*	R	L, S
7	*Ostrea lurida* Cpr	"	R	N, L
8	*Ostrea Veatchii* Gabb	"	F	.
9	*Anomia limatula* Dall, n. s	"	F	.
7950	*Rhectaxis punctocælata* (Cpr.) Dall	"	R	L
1	*Tornatina cerealis* Gld	"	R	N, L
2	*Tornatina eximia?* Baird	"	R	N

* A list of species obtained from this well, with descriptions of new species, was published by me in the Proc. Cal. Acad. Sci., v, pp. 296–299, 1874.

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7953	*Cylichna alba* Brown	San Diego. *w.*	R	N, L ?
4	*Volvula cylindrica* Cpr	"	R	L
5	*Melampus olivaceus* Cpr	"	R	L
6	*Dentalium hexagonum* Sby	"	R	S, L ?
7	*Cadulus fusiformis* ? Phil	"	?	.
8	*Acmæa mitra* Esch	"	R	N, L
9	*Acmæa insessa* Hds	"	R	N, L
7960	*Fissurella volcano* ? Reeve	"	R	L
1	*Fissurellidea callomarginata* Cpr	"	R	L
2	*Chlorostoma Pfeifferi* Phil	"	R	L
3	? *Vitrinella* sp. ind	"	?	S
4	*Crucibulum spinosum* Sby	"	R	L, S
5	*Crepidula princeps* Conr	" *w.*	R ?	N
6	*Crepidula adunca* Sby	"	R	L
7	*Serpulorbis squamigerus* Cpr	"	R	L, S
8	*Turritella Cooperi* Cpr. var	" *w.*	R	L
9	*Ceritheda sacrata* Gld	"	R	L
7970	*Bittium quadrifilatum* Cpr	Santa Barbara.	R	L
1	*Bittium asperum* Cpr	"	R	L
2	*Litorina scutulata* Gld	San Diego.	R	N, L
3	*Lacuna vincta* Mont	Santa Barbara.	R	N
4	*Lacuna solidula* Lovèn	San Diego.	R	N
5	*Rissoina* (like) *Woodwardi* Cpr	"	R	S
6	*Myurella simplex* Cpr	"	R	L, S
7	*Drillia penicillata* Cpr	"	R	L, S
8	*Drillia Hemphillii* Stearns	"	R	S
9	*Surcula Carpenteriana* Gabb	"	R	L
7980	*Mangelia angulata* Cpr	"	R	L
1	*Conus californicus* Hds	"	R	L
2	*Odostomia gravida* Cpr	"	R	L
3	*Turbonilla stylina* ? Cpr	" *w.*	R	L
4	*Turbonilla chocolata* Cpr	"	R	L, N ?
5	*Turbonilla virgo* ? Cpr	"	R	L
6	*Turbonilla torquata* ? Cpr	"	R	L
7	*Eulima micans* Cpr	"	R	L
8	*Scalaria indianorum* Cpr	"	R	L
9	*Scalaria indianorum* var	"	R	L
7990	*Scalaria tincta* Cpr	"	R	L
1	*Scalaria Hemphillii* Dall, n. s	"	F	.
2	*Opalia anomala* Stearns	"	F	.
3	*Opalia varicostata* Stearns	"	F	.
4	*Cerithiopsis assimilata* Cpr	"	R	L
5	*Cancellaria*	" *w.*	.	.
6	*Cancellaria*	" *w.*	.	.
7	*Neverita Recluziana* Petit	"	R	L, S
8	*Neverita Recluziana* var. *alta* Dall	"	R	L
9	*Mamma nana* Möller (Fos. Japan Tert.)	"	R	N
8000	*Ranella muriciformis* Brod. var	"	R	S
1	*Mitra maura* Swains	"	R	L, S
2	*Olivella biplicata* Sby	"	R	L
3	*Olivella boetica* Cpr	"	R	N, L
4	*Nassa fossata* Gld	"	R	L
5	*Nassa fossata* var	"	R	L
6	*Nassa perpinguis* Hds	"	R	L, S
7	*Nassa tegula* Rve	"	R	L, S
8	*Nassa mendica* Gld	" *w.*	R	N, L
9	*Astyris gausapata* Gld. vars	Santa Barbara.	R	L
8010	*Nitidella Gouldii* Cpr	San Diego.	R	N, L
1	*Amphissa versicolor* Dall	"	R	L
2	*Amphissa versicolor* Dall	Santa Barbara.	R	L
3	*Monoceros engonatum* Conr	San Diego.	R	L
4	*Cerostoma Nuttallii* Conr	"	R	L
5	*Pteronotus festivus* Hinds	"	R	L
6	*Trophon* (*orpheus* jun. ?)	Santa Barbara.	R	N, L
7	*Purpura crispata* Chemn	San Diego.	R	N, L
8	*Fusus Harfordi* Stearns	"	R	N, L ?
9	*Serpula* sp. indet	"	?	.
8020	Fish-teeth, one species, indet	"	?	.

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This, it will be observed, contains one hundred and seven well determined species, omitting several doubtful ones, of which ten are extinct and ninety-seven still found recent. Of these recent or still existing forms, twenty are found in the Californian fauna and northward at the present time. Eighteen more are found in the Californian fauna and southward, while forty-four are strictly Californian. Besides these, there are eight species belonging to the Oregonian or Arctic fauna, and no longer found living in the Californian region. Seven more are found on the west coast of Mexico, the Gulf of California, or Western Middle America, and, so far as known, no longer in the Californian region. One or two species are still found living in Atlantic seas, but not on the western shores of America. How far these peculiarities of distribution may be explained by a restriction of their geographical range in modern times by some species, or by the association of fossils in one collection from beds of differing age, and consequently exhibiting the fluctuation of the northern and southern faunæ based on varying temperatures of the sea, will be determined only by a most critical stratigraphical study of the localities.

But in either case the problem is well worthy of solution. The very modern character of the beds is determined by the great majority of the species being still found living, and by the fact that some of them retain very evident traces of their original coloration. They are mostly in excellent preservation. The well fossils taken with those mentioned on p. 3 would give a vertical range of some six hundred feet for the Pliocene Tertiary beds of California.

The species which appear to be new are as follows:—

Axinea profunda, n. s. (7935).

Shell subtriangular, ventral margin rounded, umbos erect, rather small. Area narrow, deep; marked by five or six lines meeting at an angle in the vertical of the umbo, one above another; anterior lines somewhat the shortest; exterior marked by twenty-five or thirty flattened ribs, separated by deep channels one-fourth as wide as the ribs, and by which the interior margin is crenulated. The ribs are crossed by thread-like close lines of growth, which may be elevated or obsolete on the ribs, but are sharply defined in the channels, which they partially fill up in some specimens. Toward the anterior and posterior margins, the sculpture is nearly obsolete. In eroded examples, this sculpture may be entirely altered, and such are hardly recognizable as the same thing. Interior smooth or lightly radiately striate, with a tendency to an elevated narrow ridge behind the anterior scar; hinge with teeth placed as if radiating from the centre of the valve, six to nine anteriorly, and ten to fourteen posteriorly, with some ten or twelve small, crowded teeth between the two radiating sets, and placed perpendicularly and parallel with one another. Height, 32^{mm}; length, 30^{mm}; thickness, 20^{mm}; the last proportionally greater in the young.

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This species differs in its sculpture from any of the recent species ascribed to the coast, and from *A. barbarensis* Conr. (Pliocene foss.) by its shorter, more elevated, and deeper form, as well as by details of sculpture.

Pecten expansus, n. s. (7941).

Shell large, thin, with the upper valve flatter than the lower one, both with very slight convexity; outer surface of upper valves marked by sixteen to twenty sharp, radiating ridges, but slightly elevated, and whose sides shade off insensibly into the broad interspaces, which are but slightly depressed; faint indications of ridges appear between the principal ones. The entire surface is covered with fine, slightly raised, sharp lamellæ, which are waved in some places so regularly as to produce the appearance of a delicate reticulation, which, however, does not really exist; angle of the umbo about 120°; ears finely sculptured, like the rest of the surface, but with only faint indications of ridges, sharply differentiated from the rest of the shell, very short, broad; supra-foraminal ear with a sigmoid curve to the lateral margin; margin of the other ear nearly straight; hinge-line straight; interior of the valve smooth, except for faint depressions corresponding to the ridges; peripheral margins not crenulated, even or nearly smooth.

Lower valve with twenty-five or thirty dichotomous ribs, flattened above, but not sharply differentiated from the interspaces, sculptured with fine lines of growth or nearly smooth, with faint appearances of radiating striæ. Peripheral margin somewhat crenulated by the ends of the ribs; interior marked by shallow channels corresponding to the ribs; ears rather small and distinctly but not strongly marked off from the rest of the valve; byssal notch rounded, moderately deep. Height of shell, 135^{mm}; breadth of shell, 140^{mm}; breadth of hinge-line, 65^{mm}; thickness, 32^{mm}; some specimens one-half larger.

This shell is nearest *P. propatulus* Conr. (*caurinus?* of Gould) from the Miocene of Oregon, but differs in all its details when compared. The Miocene shell has a sharper umbonal angle, larger ears with straight lateral margins, and strong and different sculpture; the ribs are not dichotomous, and are much more sharply defined, while the margins are strongly crenulated. It is possible that some of the indeterminate nominal species of Conrad may have been based on this species, but the wretched figures given by him seem to differ strongly so far as they show any characters, while his descriptions are quite worthless, as usual.

Pecten Stearnsii, n. s. (7942).

Shell moderately large, thin, regular; elegantly radiately ribbed. Upper valve flattened or even a little concave, with about twenty four regularly rounded, vaulted, even ribs, separated by slightly wider channelled interspaces; the whole surface covered with fine, sharp, concentric, regular lamellæ, a little looped backward over the top of the ribs, but showing no appearance of reticulation anywhere; ears small, nearly

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symmetrical, covered with more elevated, crowded, concentric lamellæ, especially near the margins; hinge-margin straight, or even a little concave toward the umbo; peripheral margins of the valves strongly and regularly crenulated and interlocking; interior regularly deeply grooved, to correspond with the external ribs; lower valve slightly convex, with about twenty-six regular even ribs, separated by channelled interspaces somewhat narrower than the ribs; the top surface of each rib is flattened with a broad, shallow groove in the middle, with one or two faint riblets on each side of the groove; the whole surface is covered with concentric lamellæ, like those of the upper valve, but less sharp, and about twice as crowded. Ears subequal, arched, covered with crowded, elevated lamellæ; byssal notch very small. Height of shell, 90^{mm}; breadth, 100^{mm}; breadth of hinge-line, 34^{mm}; thickness, 15^{mm}.

This very elegant species, while also showing some general resemblance to *P. caurinus* Gld., forms a passage toward the section *Janira*, and differs in many details from any described west-coast species, recent or fossil, so far as figures and descriptions serve to indicate.

Pecten Hemphillii, n. s. (7943).

This species has a strong general resemblance to the last, and is best described by comparison with it. *P. Hemphillii* is smaller, with sixteen ribs, as against twenty-six in a *P. Stearnsii* of the same size, with which throughout it will be compared; the lateral margins of the ears are perpendicular and straight, instead of outwardly rounded; the hinge-line is perfectly straight, not slightly concave; the ribs on the lower valve are flattened above, with symptoms of a groove on the top surface, instead of beautifully roundly vaulted; the interspaces are of course wider; the raised concentric lamellæ toward the periphery become long, coarse, and very crowded; on the lower valve, the shell is more vaulted, with hardly any traces of the raised lamellæ, and with larger, rude, hardly flattened, radiating ribs, which show no trace of grooving or riblets; the ears and byssal notch are smaller and more coarsely sculptured. Height, 56^{mm}; breadth, 63^{mm}; breadth of hinge-line, 28^{mm}; thickness, 15^{mm}.

This species seems to approach *Janira* even more closely than the last, but the value of these sections of *Pectinidæ* is very questionable.

Anomia limatula, n. s. (7949).

Shell large, thin, irregular, with a rather thickened hinge-line; external surface rough (when not worn), like the fresh fractured surface of a piece of china-ware; a few faint radiating lines with the lines of growth comprise the sculpture; shell originally yellowish, and still retaining some of its color and lustre. Normal form apparently that of a *Pecten* without ears. Breadth, 75^{mm}; height, 70^{mm}; arch of valve, 10–15^{mm}.

No lower valves were obtained. This large species is neither *A. lampe* Gray nor *A.* (*Plac.*) *macroschisma* Desh., which are the only recent spe-

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cies known to inhabit these coasts, while the only fossil one, *A. subcostata* Conrad, a species from the Colorado Desert, appears to be different, as the name would imply. For this reason, I have attached a name to the rather imperfect material received from Mr. Hemphill.

Scalaria Hemphilli, n. s. (7991).

Shell in general resembling a robust specimen of *S. indianorum*, having from nine to twelve varices on the last whorl, coronated behind near the suture, wholly pure white; surface of the whorls beneath the varices longitudinally delicately sculptured, with alternate riblets and grooves. Length about an inch; apical angle about 30°.

This species has the sculpture of *S. bellastriata*, but the shape of *S. indianorum*, and is the only grooved species, except the former, which has yet been reported from this region. All the specimens are decollate. The specimens were sent by Mr. Hemphill with the suggestion that they might prove to be new, and an examination has confirmed the suggestion. I take much pleasure in dedicating it to its discoverer.

The two species of *Cancellaria* mentioned were obtained from the San Diego well some years since, but having been mislaid cannot at this moment be identified. *Mamma nana* Möller is now found living in Arctic seas and fossil in the Tertiary of Japan.

WASHINGTON, *February* 3, 1878.

THE MANUFACTURE OF PORPOISE-OIL.

By Capt. CALEB COOK, of Provincetown, Mass.

About the year 1816, sailors and fishermen having caught a porpoise on their voyage, would sometimes extract the oil from the jaw-bone and give it to carpenters and those who used oil-stones for sharpening their tools. Finding in this way that it did not gum nor glue, suggested the idea that it was just what was wanted for a nice lubricator. It was noticed that the weather at zero would not congeal it, neither would it corrode on brass.

Watchmakers were then using olive-oil as the only fitting oil for watches; but by experimenting with the porpoise-jaw oil they found it superior to the olive or any other oil, consequently the sailors and fishermen found a ready market for all they were able to obtain.

This state of things continued until the year 1829, when a shoal of blackfish, about forty in number, was taken at Provincetown, Mass., being the first for many years. Solomon Cook, of that town, took from the jaws of those blackfish a few gallons of oil, and sent it to Ezra Kelley, of New Bedford, Mass., a skillful watchmaker, to be tested for watch-oil. Mr. Kelley soon found that this oil was superior to the porpoise-oil, as it had more substance and less chill. He contracted with Solomon Cook to supply him from year to year until 1840, when Solomon Cook died, and his oldest son supplied Mr. Kelley until the

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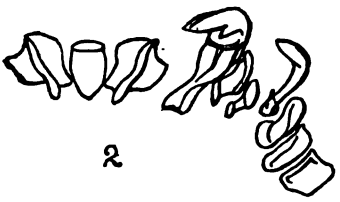

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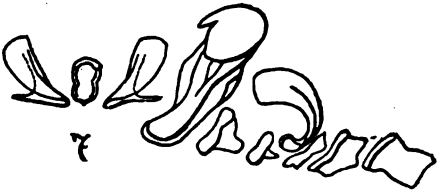

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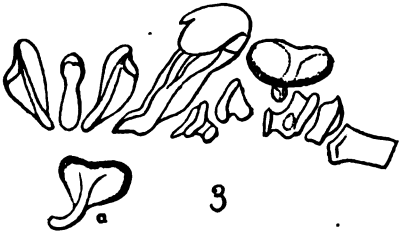

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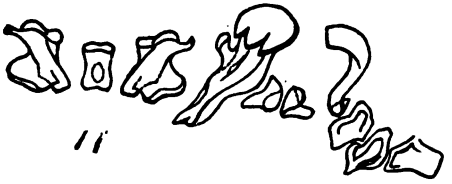

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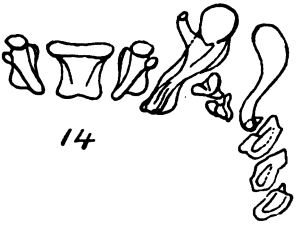

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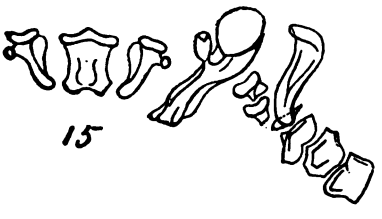

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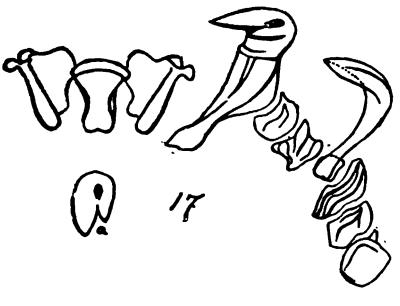

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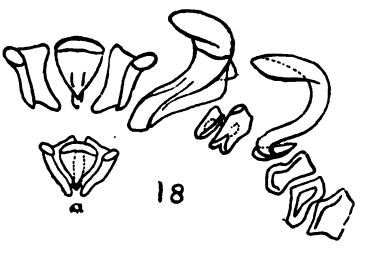

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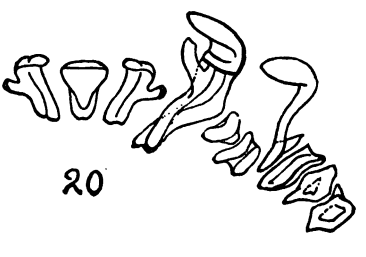

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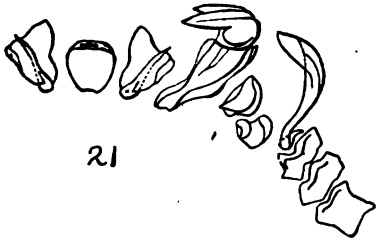

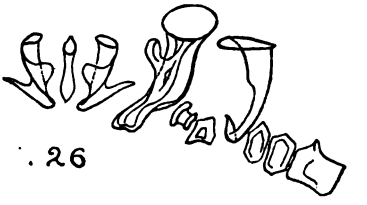

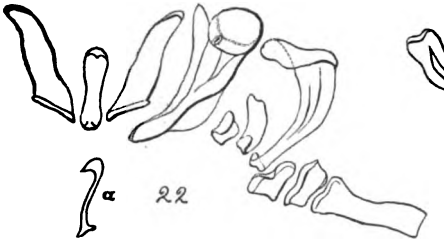

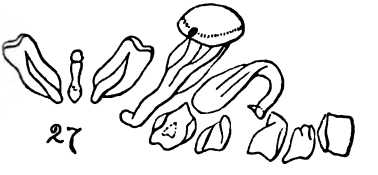

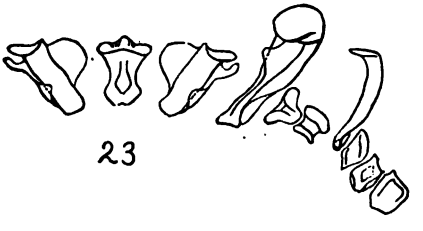

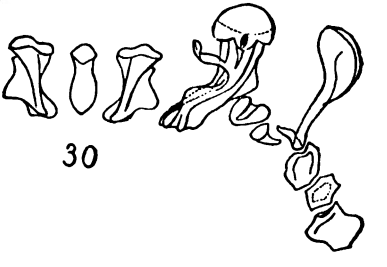

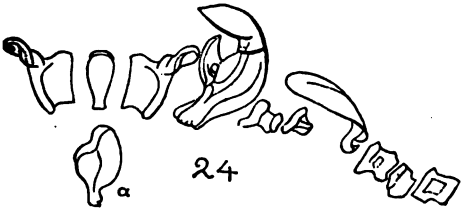

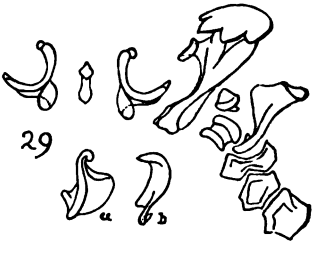

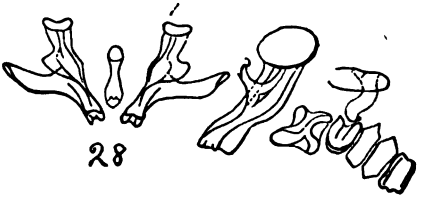

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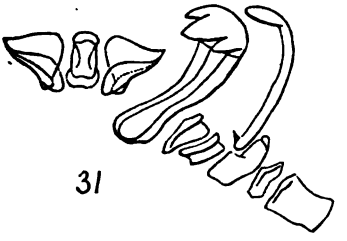
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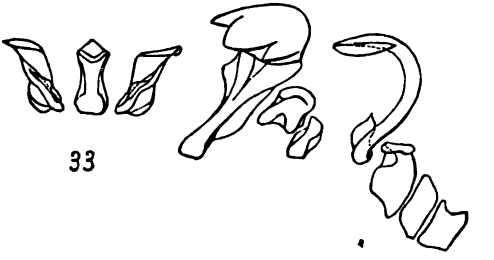
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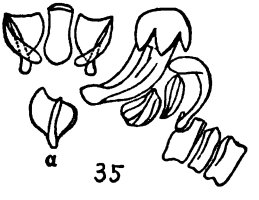
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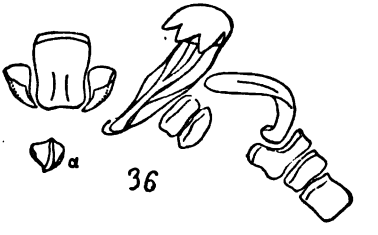
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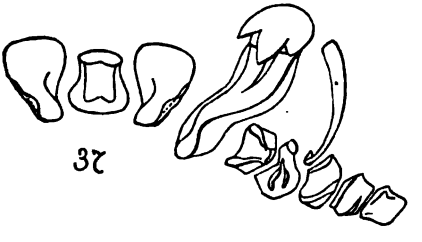
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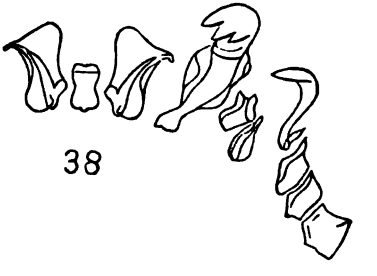
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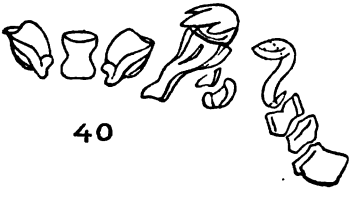
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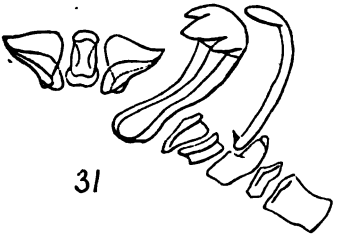

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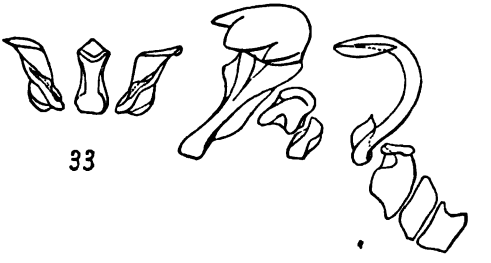

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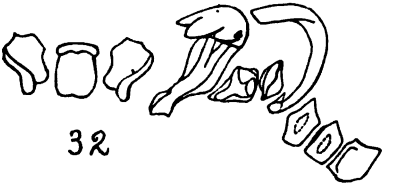

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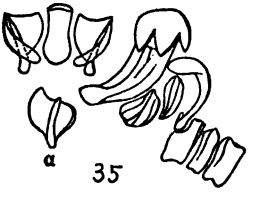

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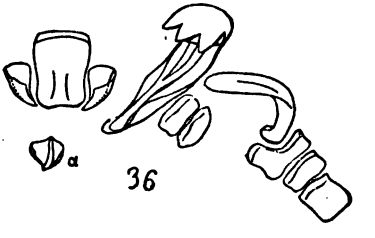

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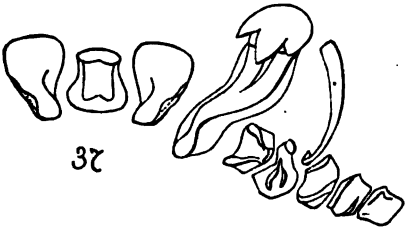

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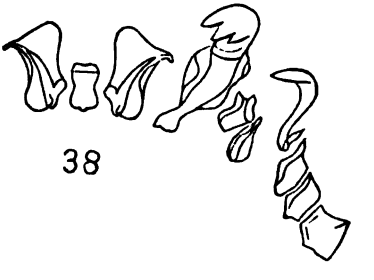

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demand was so great that the jaws of the blackfish were not sufficient to supply the market.

Porpoise-jaw oil can be refined a little by exposure to the cold at zero, and in that state, with the atmosphere at zero, it is strained through a cotton flannel strainer made in the shape of a cone, but when filtered through paper it is so limpid that it has no lubricating properties whatever, and becomes useless. This oil is called porpoise-jaw oil, but is taken from the blackfish, belonging in the family of whales, by a method known only by myself. It is warranted not to congeal with cold at zero, though it will thicken and turn a little milky in appearance. It is warranted not to corrode on brass or rust on steel, and it will not glue on the finest watch. Ezra Kelley, of New Bedford, Mass., has made it a business for many years to put it up for watch use, and has led in the market, while B. H. Tisdale, of Newport, R. I., and I. M. Bachelder, of Boston, are getting quite popular in the European market.

Caleb Cook, youngest son of Solomon, from scientific experiments did discover, about the year 1842, that the melon-oil of the blackfish was far superior to the jaw-oil in every respect—so much so that Mr. Kelley, who had about this time become very popular in preparing this oil for the trade, would not buy it until he was told what it was produced from; and from that time to the present, 1876, Caleb Cook's blackfish-melon (watch) oil has been refined by Kelley, of New Bedford, Bachelder, of Boston, Tisdale, of Newport, and many others on a smaller scale, for the world's use. Since the year 1842, Caleb Cook, of Provincetown, Mass., claims to be the only person who understands the art of producing this oil free from all glutinous matter and fit for use. This, he says, is done by a process known only by himself—not by mixing other oils or liquids with it, but by extracting all the acid and gluten from it, and leaving the oil pure for the finest and most delicate machinery. This, he says, cannot be done by the chilling and straining process; for when it becomes perfectly transparent at zero, the lubricating properties are all gone, the oil runs off the pivots, spreads on the plates, dries up, the pivots cut, turn red, and the oil is worse than worthless, for the valuable timekeeper is no longer what it was once for the want of oil with more substance and lubricating properties.

Porpoise-jaw oil and blackfish-melon oil are worth from $5 to $15 per gallon, according to supply. These oils are sold under the above trade-names, and also under the names "watch-oil" and "clock-oil". They are used largely by manufacturers of firearms, watches, and philosophical apparatus. Smith & Wesson, of Springfield, Mass., the Ethan Allen factory, at Worcester, Bye & Johnson, of Worcester, the Howard Watch Company, the Elgin Watch Company, the Waltham Watch Company, and the clock-factories in Connecticut, use them constantly. The philosophical-instrument makers use them for air-pumps, as they keep the leather always soft and pliable. Telegraph-instrument makers

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use them when they can get them. They are used in government light-houses for the clocks of revolving lights. The color of the oils is very light, and can be made very white by placing in the window, where they will bleach in a short time. One drop of water in one pint of the oil will injure it very much.

It may be interesting to know how those fish or whales are taken. They make their appearance about the shores of Cape Cod and Barnstable Bay from early in the summer until early in winter; and when it becomes known that a shoal of blackfish is in the bay, the boats are manned and proceed at once to get in their rear; and, as the fish are at the surface of the water the most of the time, it is easy to tell how to manage to keep them between the boats and the shore. While in this position the men in the boats will make all the noise with their oars they can, and that will cause them to go in the opposite direction from the boats and toward the shore; and when the fish find that they are in shoal water, by seeing the sandy bottom, they become alarmed, and go with all their might till they run fast aground on the sand. The boats then row in their midst; the men with lance in hand jump out of their boats into the water, and butcher them as a butcher would a hog, and it becomes one of the most exciting occasions that it is possible to imagine, for the water flies in every direction, and the blood flows freely until death puts an end to the great tragedy. When the water ebbs and leaves them dry, their blubber is taken off, cut in slices, and the oil tried out. About thirty gallons upon an average is what one fish will make, and the melons will average about six quarts. The melons are taken from the top of the head, reaching from the spout-hole to the end of the nose, and from the top of the head down to the upper jaw. When taken off in one piece, they represent a half watermelon, weighing about twenty-five pounds. When the knife is put into the centre of this melon, the oil runs more freely than the water does from a very nice water-melon—hence the name melon-oil.

About the same time that the blackfish made their appearance in our waters, another of the whale species made its appearance also, called by the fishermen "cowfish" and by the historian "grampus". These whales are very much in the shape of the blackfish, only smaller, not so fat, and not so dark-colored. The oil from the melon of this fish is thought to be superior to anything yet found in the blackfish or the porpoise. It is of a very yellow color, and when reduced by the chilling and straining process it appears to have all the body and lubricating properties that are wanted for the very best watch-oil; but as it will take one year to determine it by practical experiments, it is thought best to keep it out of the market for the present.

This fish has made its appearance in our waters but three or four times in the last forty years, or about once in ten years. The method of taking it is the same as for the blackfish.

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THE CRAIG FLOUNDER OF EUROPE, GLYPTOCEPHALUS CYNOGLOSSUS, ON THE COAST OF NORTH AMERICA.

By G. BROWN GOODE and TARLETON H. BEAN.

An unfamiliar pleuronectoid fish was found in our waters, in 1877, by the United States Fish Commission (Prof. S. F. Baird, Commissioner). Numerous specimens were trawled in the deep water off Salem, Mass., on La Have Bank, and on the coast of Nova Scotia, off Halifax, in Halifax Harbor, and in Bedford Basin, Halifax.

A careful study proves that they belong to a well-known European species, the *Pleuronectes cynoglossus* of Linné, lately referred by Professor Gill to the genus *Glyptocephalus* of Gottsche. We also discover the identity of this species with *Glyptocephalus acadianus*, described by Gill, from a single specimen (No. 12685), taken by the Commission in 1872, from the herring-weir on Treat's Island, Eastport, Me.

Below are given detailed measurements of twenty-two individuals, including authentically named European specimens from the University of Christiania, and the Bonaparte Collection, the type of *G. acadianus*, three specimens from Massachusetts Bay, five from La Have Bank, and eleven from the vicinity of Halifax.

The genus of Gottsche was carefully redescribed by Professor Gill in 1873,* and at the same time was published a full specific description of the Eastport specimen. Although this description is founded upon an individual which is among the most elongate of the series before us, it is thoroughly satisfactory for all, if the tendency to variation in the following particulars be noted.†

(1) *Height of body.*—This is stated to be about 2⅔ of length exclusive of caudal, and 3¼ in total length. In the series studied, the proportions of this element varied, stated in units of hundredths of total length (including caudal), from 0.245 to 0.375, No. 12685 having it 30. An equally wide variation in the European fish is recorded by Parnell.‡

The *Pleuronectes elongatus* of Yarrell is not nearly so elongated as No. 21061 *a* (the figure of Couch has height about 0.275); and since no other diagnostic characters have been described, we place it without hesitation in the synonymy of *G. cynoglossus*.

(2) *Height of caudal peduncle.*—This element is subject to very slight variation, measuring usually 0.07 of total in both European and American specimens. The most elongate, slender forms have it slightly narrower. In No. 12685 it measures 0.06, and 0.065 in No. 21001 *b*.

(3) *Length of head.*—This varies from 0.15 to 0.175. In No. 12685 the

* On a new American species of Pleuronectoid (*Glyptocephalus acadianus*). By Theodore Gill, M. D. <Proceedings of the Academy of Natural Sciences, Philadelphia, 1873, pp. 360–362.

† Instead of having its radial formula D. 110; A. 100, as stated in the description, No. 12685 has it D. 107; A. 96.

‡ Fishes of the Frith of Forth, p. 210, pl. xxxviii, and in Memoirs of the Wernerian Society, vii, p. 370.

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length is 0.15, and in the European specimens 0.15 and 0.1575 (Christiania specimen). The smallest proportion is represented by specimens from Massachusetts Bay and Halifax.

(4) *Teeth.*—In number these are extremely variable. No. 12685, according to Gill, had on the blind side 17 above and 20 below, on the eye side 6 above and 7 below. A Salem specimen, larger and older, had on the blind side, above 26, below 28, on the eye side, above 13, below 14. In young individuals, the teeth present the characters described by Gill, having the teeth on the eyed side conical and separated. This peculiarity disappears with age, all large specimens showing closely set incisorial teeth upon both sides of each jaw.

(5) *Length of pectoral.*—This is extremely variable within limits of 0.09 and 0.14. This measurement refers to the fin upon the colored side. Its shape is also variable; it is sometimes pointed, sometimes obtuse, owing to difference in comparative length of the upper rays. It is usually black, with a narrow whitish tip. The number of rays varies from 9 to 14.

(6) *Length of ventrals.*—This is also extremely variable on both sides. The range on the blind side is 0.0475 to 0.07, and on the eyed side 0.056 to 0.0775. The difference between the length of the two fins upon the same individual varies from 0.0025 to 0.0155.

(7) *Contour of lateral line.*—In some individuals this is essentially straight, in others considerably arcuated above the pectoral. This appears to be an individual variation. The two European specimens show a perceptible difference in this respect. In his diagnosis of *Pleuronectes cynoglossus*, Dr. Günther states that the lateral line is straight, without curve.

(8) *Position of the eyes.*—Dr. Günther states that in *P. elongatus* the upper eye is in advance of the lower. This is doubtless quoted from Yarrell. Neither the figure of Yarrell nor that of Couch indicates any such character.

(9) *Scales in lateral line.*—The number on the blind side ranges from 109 to 150, on the eye side from 110 to 140, there being no relation between the different sides of the same fish.

(10) *Radial formula.*—In the dorsal this ranges from 102 to 120; in the anal, from 87 to 100. There is no apparent relation between the number of rays and the relative proportions of height and length of body. A large number of rays in the dorsal is usually accompanied by a relatively large number in the anal.

(11) *Transverse rows of scales.*—Their number above and below the lateral line is nearly equal. The range is about from 40 to 50. There appears to be no relation of number of transverse rows to comparative height of body.

The thermal range of the species appears to be defined nearly by the limits 34° and 45° F.

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The synonymy of the genus and species stands somewhat as follows:—

GENUS.

Glyptocephalus, GOTTSCHE, Archiv für Naturg. i, 1835, p. 156.—BLEECKER, Compt. Rend. Acad. Sci. Amsterdam, xiii.—GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 360.

SPECIES.

Glyptocephalus cynoglossus (Linné) Gill.

Pleuronectes oculis a dextris totus glaber, ARTEDI, Gen. 14, N. 3; Mus. Ichth. No. 39; Synon. p. 31, N. 3.

Pleuronectes cynoglossus, LINNÉ, Syst. Nat. ed. x, i, 1758, p. 269; ed. xii, 1766, i, p. 456.—GÜNTHER, Cat. Fish. Brit. Mus. iv, 1862, p. 449.

Glyptocephalus cynoglossus, GILL, Proc. Acad. Nat. Sci. Phila. 1873, p. 361.

Pleuronectes pola, LACÉPÈDE, Hist. Nat. Poiss. (Suites à Buffon), 1819, iv, p. 401.

Platessa pola, CUVIER.—PARNELL, Nat. Hist. Fish. Frith of Forth, 1838, p. 210, pl. xxxviii.—YARRELL, Hist. Brit. Fish. 1841, ii, p. 315.—COUCH, Fishes British Islands, iii, 1864, p. 190.

Pleuronectes saxicola, FABER, Isis, 1828, p. 877.

Glyptocephalus saxicola, GOTTSCHE, *l. c.*

Pleuronectes nigromanus, NILSSON, Prodr. Ichth. Scand. 1832, p. 55.

Platessa elongata, YARRELL, *op. cit.* p. 318.—GÜNTHER, *op. cit.* p. 450.—COUCH, *op. cit.* p. 193.

Glyptocephalus elongatus, GILL, *op. cit.* p. 362.

Glyptocephalus acadianus, GILL, *op. cit.* p. 361, and in BAIRD's Report on Fisheries of South Coast of New England, 1873, p. 794.

Dr. Günther suggests that the fish first cited by Fabricius (*Fauna Groenlandica*, p. 163), under the name of *Pleuronectes cynoglossus*, and subsequently named by him *Pleuronectes pinguis* (Afhandling. Kongel. Danske Videnskabernes Selskabs, Naturvid. og Math., Copenhagen, vol. i, 1824, p. 45), is probably identical with this species. The true relations of the Greenland fish have already been pointed out by Professor Gill (Proc. Acad. Nat. Sci. Phila. 1864, p. 218), as well as the curious misapprehension by which the synonymy of *P. pinguis* and the halibut has been confounded.

The following tables give detailed measurements of twenty-three specimens, and a list of all the specimens in the National Museum:—

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TABLE I.—*Catalogue of specimens in National Museum.*

Catalogue number.	Number of specimens.	Locality.	When collected.	From whom received.	Nature of specimen.
21000	13	Massachusetts Bay, off Salem	Aug. —, 1877	United States Fish Commission.	
21001	11	La Have Bank	do	do	
21005	2	Halifax	do	do	
21017	3	27 miles south by west from Chebucto Head.	Sept. 6, 1877	do	
21019	20	Halifax	Sept. 4, 1877	do	
21032	1	do	Sept. 11, 1877	do	
21047	2	Halifax (trawl 113 and 114)	Sept. 24, 1877	do	
21056	4	Massachusetts Bay	Aug. 6, 1877	do	Young.
21057	1	do	do	do	Do.
21058	2	Massachusetts Bay (trawl 32, 90 fathoms).	Aug. 14, 1877	do	Do.
21059	1	Halifax (trawl 54)	Aug. 25, 1877	do	Do.
21060	1	Halifax (trawl 44)	Aug. 21, 1877	do	Do.
21061	3	27 miles off Chebucto (trawl 85)	Sept. 6, 1877	do	Do.
21062	1	Halifax (trawl 106, 111 fathoms)	Sept. 20, 1877	do	Do.
21063	1	Bedford Basin (trawl 111, 37 fathoms).	Sept. 21, 1877	do	
10068	1	Europe		Bonaparte Collection	
17355	1	Christiania, Norway		Norwegian Government	
19685	1	Eastport, Me	Aug. —, 1879	United States Fish Commission.	

TABLE II.—*Measurements.*

Current number of specimen	10,068	17,355	21,000 *a*	21000 *b*	21,000 *c*	12,685	21,001 *a*
Locality	Europe, Bonaparte Coll.	Christiania, Swedish Coll.	Massachusetts Bay.	Massachusetts Bay.	Massachusetts Bay.	Eastport.	La Have Bank.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches	15.75	15.15	17.25	19	23	9.5	9.9
Body:							
Greatest height	0.315	0.33	0.34	0.325	0.34	0.30	0.307
Least height of tail	0.07	0.07				0.06	
Head:							
Greatest length	0.15	0.156	0.155	0.15	0.165	0.05	0.16
Length of maxillary	0.035	0.0375				0.035	
Length of mandible	0.05	0.05				0.05	
Diameter of orbit	0.05	0.05				0.05	
Pectoral:							
Distance from snout	0.16	0.16				0.16	
Length	0.09	0.105				0.10	
Ventral:							
Distance from snout	(0.19)	0.18				0.17	
Length (blind side)	0.05	0.056		0.051	0.055	0.06	0.052
(eye side)	0.056	0.062		0.057	0.057	0.065	0.065
Dorsal	112	103	112	110	110	107	101
Anal	99	87	90	93	91	96	87
Pectoral	11	11	12	11	13	13	11
Ventral	6	6	6	6	6	6	6
Number of scales in lateral line (blind side)	117	114	150	138	136	128	113
(eye side)	115	116	140	133	134	118	117

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TABLE II.—*Measurements*—Continued.

Current number of specimen	21,001 *b*	21,001 *c*	21,001 *d*	21,001 *e*	21,005 *a*	21,005 *b*	21, 017	21,047 *a*
Locality	La Have.	La Have.	La Have.	La Have.	Halifax.	Halifax.	Halifax.	Halifax.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches	10. 2	11. 5	12	12. 25	15. 75	19	16. 25	19
Body:								
Greatest height	0. 295	0. 299	0. 33	0. 325	0. 37	0. 35	0. 336	0. 32
Least height of tail	0. 065	.....	.....	.....	.....	.....	.....	.....
Head:								
Greatest length	0. 16	0. 16	0. 165	0. 16	0. 155	0. 155	0. 157	0. 155
Length of maxillary	0. 04	.....	.....	.....	.....	.....	.....	.....
Length of mandible	0. 06	.....	.....	.....	.....	.....	.....	.....
Diameter of orbit	.....	.....	.....	.....	.....	.....	.....	.....
Pectoral:								
Distance from snout	.....	.....	.....	.....	.....	.....	.....	.....
Length	.....	.....	.....	.....	.....	.....	.....	.....
Ventral:								
Distance from snout	.....	.....	.....	.....	.....	.....	.....	.....
Length (blind side)	0. 052	0. 047	.....	0. 055	0. 053	0. 047	0. 055	0. 057
(eye side)	0. 065	0. 058	.....	0. 065	0. 062	0. 063	0. 06	0. 063
Dorsal	115	110	107	113	105	120	106	111
Anal	97	95	88	98	92	100	90	95
Pectoral	11	11	12	13	12	11	12	10
Ventral	6	6	.....	6	6	6	6	6
Number of scales in lateral line (blind side)	112	130	115	117†	109	133	125	127
(eye side)	119	128	110	117†	115	127	128	125

Current number of specimen	21,047 *b*	21,019 *a*	21,019 *b*	21,019 *c*	21,019 *d*	21,019 *e*	21, 032	21,061 *a*
Locality	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.	Halifax.
	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.	100ths.
Extreme length, in inches	24. 25	21. 5	19	20	20. 25	19	19. 25	114 *mm.*
Body:								
Greatest height	0. 37	0. 365	0. 375	0. 316	0. 33	0. 34	0. 365	0. 245
Least height of tail	.....	0. 07	0. 07	.....	.....	.....	.....	0. 055
Head:								
Greatest length	0. 175	0. 16	0. 156	0. 152	0. 155	0. 15	0. 175	0. 165
Length of maxillary	.....	0. 03	0. 03	.....	.....	.....	.....	0. 045
Length of mandible	.....	0. 05	0. 05	.....	.....	.....	.....	0. 06
Diameter of orbit	.....	0. 05	0. 05	.....	.....	.....	.....	0. 06
Pectoral:								
Distance from snout	.....	0. 157	0. 160	.....	.....	.....	.....	0. 17
Length	.....	0. 14	0. 11	.....	.....	.....	.....	0. 08
Ventral:								
Distance from snout	.....	0. 17	0. 17	.....	.....	.....	.....	0. 20
Length (blind side)	0. 047	0. 07	0. 057	0. 065	0. 055	0. 05	0. 067	0. 055
(eye side)	0. 06	0. 077	0. 067	0. 075	0. 06	0. 06	0. 077	0. 055
Dorsal	106	109	113	106	114	102	106	104
Anal	92	98	99	91	97	87	90	87
Pectoral	12	12	11	11	11	11	11	14
Ventral	6	6	6	6	6	6	6	6
Number of scales in lateral line (blind side)	117	117	130	112	131	119	129	.....
(eye side)	122	121	130	117	127	115	125	.....

NOTE ON SHELLS FROM COSTA RICA KITCHENMIDDEN, COLLECTED BY DRS. FLINT AND BRANSFORD.

By W. H. DALL.

In their archæological explorations in Costa Rica, while examining the shell-mounds of Culebra near the western coast, a number of shells were obtained from the mounds to exhibit the species of which the shell-heaps were composed. They are, of course, in a semi-fossil condi-

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tion and usually broken, but the following species have been identified:—*Phyllonotus nigritus* Mensch., *Strombus gracilior* Sby., *Arca grandis* Brod., *Chione dionæa* Menke, *Cardium procerum* Sby., and *Cardium consors* B. & S. These species, which formed part of the food-supply of the former inhabitants, are abundant in the fauna of the Gulf of California at the present day.

FEBRUARY 22, 1878.

ARSENIC ACID FOR PROTECTING ANATOMICAL PREPARATIONS FROM INSECTS.

By J. B. S. JACKSON, M. D.

Arsenic acid is most intensely strong, and comes in the form of a solid and of a liquid, and the two are of about equal strength. Half an ounce (avoirdupois) of the one, or one-half of a fluid-ounce of the other, is to be added to a pint (f℥ xvj) of soft water, and it is ready for use. Any membranous preparation that is to be distended and dried, as a portion of the alimentary canal, any of the hollow organs, an ovarian cyst, an aneurism, and many preparations that are not to be distended, will be most thoroughly protected, I believe, by the arsenical solution. A solution of corrosive sublimate will probably prove an equal protection; but the membrane, when dried, has a disagreeably opaque and ash-colored look, whereas, after the arsenical solution, it dries without any change. I cover the preparation fairly with the solution, and leave it for about twenty minutes, then take it out, let it drain, then inflate or distend it, and, lastly, hang it up to dry.

BOSTON, MASS., *February* 19, 1878.

THE OCEANIC BONITO ON THE COAST OF THE UNITED STATES.

By G. BROWN GOODE and TARLETON H. BEAN.

A specimen of the Oceanic Bonito, *Orcynus pelamys* (Linné) Poey, was captured off Provincetown, Mass., in July or August, 1877, and taken to the Museum of Comparative Zoölogy by Mr. James H. Blake. The specimen was lent to the Fish Commission for study. Drawings have been made, and a table of measurements and description are here presented.

The specimen measures 447 millimetres (17.6 inches) to the end of the caudal carina. In form it closely resembles *Orcynus alliteratus*. The caudal rays are frayed, and their length cannot be exactly determined. The height of the body is a trifle more than one-fourth (0.26) of the length. The circumference of the body (0.71) is equal to the distance from snout to origin of anal (0.70). The length of the head (0.30) is

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contained 3⅓ times in length of body. The width of the interorbital region (0.075) is as much less than the length of snout (0.08) as it is greater than the length of the operculum (0.07). The length of the maxillary (0.11) is nearly equal to that of the ventral (0.115), and more than double the diameter of the orbit (0.05). The length of the mandible (0.14) is double that of the operculum.

The distance of the first dorsal fin from the snout (0.34) is slightly greater than that of the pectoral (0.325), and less than that of the ventral (0.38) by a distance nearly equal to the diameter of the orbit; it is also a trifle less than half the distance from the snout to the origin of the anal (0.70).

The length of the first dorsal spine (0.145) is double the length of the longest anal ray (0.0725). The distance from the origin of the first dorsal to the end of the base of the second dorsal (0.36) is four times the length of the anal base (0.09).

The length of the pectoral (0.15) is less than half its distance from the snout (0.325), and exactly half the length of the head; it is contained 6⅔ times in the length of the body; its origin is slightly in advance of the origin of the dorsal, while its extremity reaches to the vertical from the tenth dorsal ray.

The length of the ventral (0.115) is about one-third that of the distance of the first dorsal from the snout.

The corslet is very prominent. Its contour is defined by lines beginning at the edge of the branchial cleft, about midway between the axil of the pectoral and the median line of the belly, extending below, beyond, and around the extremity of the pectoral (which, when normally placed, touches with its tip the outer margin of the corslet), then extending beyond its tip for a distance nearly equal to its length, round up into the lateral line, down which a narrow tract of scales continues to its extremity, though narrowed to a single row after passing its curve; passing the lateral line, the contour of the corslet curves forward and inward, then ascending to a point distant from the median line of the back about the diameter of the orbit, it follows backward in a direction parallel to this line, to a point opposite the posterior extremity of the second dorsal, where it curves upward to the median line of the body, and completes its circuit.

When viewed from above, the rows of scales appear to be arranged concentrically about the origin of the first dorsal fin. The scales are largest along the edges of the pectoral arch and the dorsal fin, decreasing rapidly in size as they recede from these regions. There are about thirty rows between the dorsal and the upper margin of the pectoral, normally placed.

Radial Formula.—D. XIV, 2 + 12, VIII. A. 2 + 12, VII. P. 28. V. 6.

Color.—The upper parts must have been deep blue in life; the belly and flanks below lateral line, the opercles, and throat, pearly opalescent white. The lower part of the pectoral arch and tracts at the base of

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the ventrals and anal, as well as those parts of the opercles where the bone is close to the outer skin, were of a chalky white. The corslet is bronzed brown in the alcoholic specimen.

There are four distinct bluish lines upon the sides, which are nearly parallel with the lateral line, and which constitute the most prominent specific character. The first of these begins directly under the tip of the pectoral, the second at the margin of the corslet, at a point in the line from the upper to the lower axillary angles of the pectoral. The third and fourth are rather indistinct anteriorly, but are very distinct in the posterior half of the body, and are about as far distant from each other as are the first two, the interval between the two pairs being slightly greater than that between the members of each pair, and equal to the diameter of the orbit. The first or uppermost line is nearly straight, the others, following the lower contour of the body, curve upward over the anal fin, and all four become lost in the darker color of the caudal peduncle.

This is without doubt the *Scomber Pelamis* of Linné, characterized by him as "Scomber pinnulis inferioribus VII, corpore lineis utrinque quatuor nigris" (Syst. Nat. ed. 10, 1758, i, p. 297), and given by Günther as *Thynnus pelamys* (Cat. Fish. Brit. Mus. ii, 1860, p. 364). It is hopelessly confused by Cuvier and Valenciennes with *Pelamys sarda*. Professor Poey assigned it to its present generic relations in 1868 (Syn. Pisc. Cubens. p. 362).

The geographical distribution of this species is not very well known, owing to the uncertainty of its synonymy. The British Museum has two stuffed specimens, one from the Cape Seas, and one from Yarrell's Collection of British fishes. Couch records it from the Frith of Clyde (July), and from Cumberland, England, and Ireland. Poey has it from Cuba. It has also been recorded from the seas of India and China.

The presence of this form upon our coast was first suggested by Messrs. E. G. Blackford and Barnet Phillips of New York, who recognized the species in New York Market from the plates in Couch's History of British Fishes. Only one was seen, and it was unfortunately not preserved. This was in the summer of 1873; and as none have since been found, it may be said, with some certainty, that the species is at present only accidental in our fauna.

DISTRIBUTION OF CALIFORNIAN TERTIARY FOSSILS.

By W. H. DALL.

Further information has been received from Mr. Hemphill in regard to the Tertiary fossils enumerated lately in these Proceedings. These facts, having an important bearing on geological and faunal changes, are now summarized.

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STRATA OF THE SAN DIEGO PENINSULA.

The long, low, narrow strip of land lying between San Diego Bay and the ocean is locally known as the Peninsula. It appears to have been pierced formerly by narrow channels or outlets by which the waters of the bay communicated with the sea, and even now, in heavy storms, the surf breaks over the barrier. At high-water mark is a stratum about four feet thick, containing fossils mingled in a confused manner, above which is a bed of fine sand extending to the surface of the peninsula, and having a total thickness of some twelve feet. From the lower bed (A) were obtained the following species:—

Corbula luteola.
Tellina modesta.
Lucina Nuttallii.
Pecten paucicostatus.
Nucula exigua.
Rhectaxis punctocœlata.
Tornatina cerealis.
Tornatina eximia.
Volvula cylindrica.
Melampus olivaceus.
Dentalium hexagonum.
Vitrinella sp.
Crucibulum spinosum.
Crepidula adunca.
Serpulorbis squamigerus.
Litorina scutulata.
Lacuna solidula.
Rissoina Woodwardi?
Myurella simplex.
Drillia Hemphillii.
Mangilia angulata.
Odostomia gravida.
Turbonilla chocolata.
Turbonilla virgo.
Turbonilla torquata.
Eulima micans.
Scalaria indianorum.
Cerithiopsis assimillata.
Olivella biplicata.
Olivella boetica.
Nassa fossata var.
Nassa perpinguis.
Neverita, var. *alta.*
Nitidella Gouldii.
Amphissa versicolor.
Pteronotus festivus.
Fish teeth and a sp. of *Serpula.*

From the sand bed (B) were obtained,—

Periploma argentaria.
Macoma secta.
Macoma indentata.
Macoma nasuta.
Mactra californica.

In the lowest part exposed of bed A are found *Cardium procerum*, *Dosinia ponderosa*, and *Anomia limatula*, but they do not seem to be scattered through the general body of the stratum.

STRATA OF THE MAINLAND.

On the mainland near the town of San Diego, the land is rather low, gradually rising inland toward some bluffs. To the eastward of the town, or what is known locally as the "railroad land", a stratum (A^2) four or five feet thick is exposed at high-water mark, and, like the stratum A of the peninsula, contains a confused aggregation of fossils, at the bottom of which is a layer of the upper valves of *Anomia lima-*

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tula, hardly mixed with any other species, and containing, so far as could be discovered, no perfect specimens or lower valves.

Stratum A^2 is regarded by Mr. Hemphill as the outcropping of an extensive formation, probably underlying the whole of the level land back to the bluffs, and presenting estuarine characters. It is surmounted by, or passes into, a fine sandy deposit (B^2), at least seventy feet thick in some places, containing fossils scattered through it, and it is in this stratum that the fossils from the well were found. In nearly all the wells that have been sunk in San Diego, fossils have been found, showing that the bed is of wide extent as well as of great thickness.

The following fossils were afforded by stratum A^2:—

Pholadidea ovoidea.
Solecurtus californianus.
Macoma sabulosa?
Tellina Bodegensis.
Donax flexuosus.
Mactra falcata.
Clementia subdiaphana.
Chione simillima.
Chione succincta.
Dosinia ponderosa.
Saxidomus aratus jun.
Petricola pholadiformis?
Cardium procerum.
Ostrea lurida.
Anomia limatula.
Fissurellidea callomarginata.
Crucibulum spinosum.
Cerithidea sacrata.
Drillia penicillata.
Scalaria indianorum.
Ranella muriciformis.
Nassa fossata.
Nassa tegula.
Cerostoma Nuttallii.

From the well-digging in stratum B^2 came,—

Venericardia monilicosta.
Arca microdonta.
Leda coelata.
Pecten expansus.
Janira dentata.
Mamma nana.
Crepidula princeps.
Turritella Cooperi.
Turbonilla stylina.
Nassa mendica.
Cylichna alba.
Cadulus fusiformis.

To which may be added the following species not enumerated from that locality in the list (pp. 11–12) in these Proceedings, but also obtained by Mr. Hemphill:—

Glottidia albida Hds.
Xylotrya sp. (tubes).
Cryptomya californica Conr.
Solen rosaceus Cpr.
Solecurtus californianus Conr.
Macoma expansa Cpr.
Clementia subdiaphana Cpr.
Cardium centifilosum Cpr.
Lucina Nuttallii Conr.
Lucina acutilineata Conr.
Lucina tenuisculpta Cpr.
Cryptodon flexuosus Mont.
Modiola recta Conr.
Nucula exigua Sby.
Acila Lyallii Bd.
Pecten hastatus Sby.
Janira florida Hds.
Ostrea conchaphila Cpr.
Placunanomia macroschisma Desh.
Tornatina eximia Bd.

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Cylichna cylindracea Linn.
Dentalium hexagonum Sby.
Dentalium semipolitum B. & S.
Siphonodentalium pusillum? Gabb.
Calliostoma annulatum Martyn.
Galerus filosus Gabb.
Crepidula navicelloides Nutt.
Turritella Jewettii Cpr.
Bittium asperum Cpr.
Myurella simplex Cpr.
Drillia (four sp. undet.).
Surcula Carpenteriana Gabb.
Mangilia variegata Cpr.
Mangilia (four sp. undet.).
Clathurella Conradiana Gabb.
Odostomia straminea Cpr. var.
Odostomia sp.
Turbonilla torquata Cpr.
Eulima rutila Cpr.
Scalaria subcoronata Cpr.
Cancellaria (four sp. undet.).
Neverita Recluziana Petit.
Sigaretus debilis Gld.
Ranella Mathewsonii Gabb.
Olivella boetica Cpr.
Nassa fossata Gld.
Astyris tuberosa Cpr.
Astyris sp.
Ocinebra lurida Cpr.
Pteronotus festivus Hds.
Trophon orpheus Gld.
Colus Dupetithouarsi? Kien.
Volutopsis (sp. undet.).
Chrysodomus Diegoensis Dall.

About ten miles northward from San Diego, on the seacoast of California, are beds of coarse sandstone, of considerable thickness, dipping to the northward. About twenty feet of it (stratum C) are fossiliferous, containing the shells, not aggregated in a confused mass, as in some other cases above mentioned, but distributed much as they might have been while living. According to Mr. Hemphill, these fossils have not the aspect of an estuary deposit, but rather that of animals living in the open sea. *Pecten expansus* occurring in both the well (B^2) formation and this sandstone, Mr. Hemphill supposes that they may be of identical age, but that the different assemblage of species may be due to the one being formed in an estuary and the other on an open coast. This sandstone bed contained, among others, the following species:—

Pecten islandicus.
Pecten hericeus.
Pecten ventricosus.
Pecten expansus.
Pecten Stearnsii.
Pecten Hemphillii.
Pecten æquisulcatus var
Ostrea Veatchii.
Lucina acutilineata.
Opalia anomala.
Opalia varicostata.
Scalaria tincta.
Scalaria Hemphillii

Adjoining bed C, and composed of recent alluvial soil, eight or ten feet above tide-water, is another stratum (D), in which the specimens are in a poor state of preservation, and nearly all found living near San Diego at the present time. This bed afforded,—

Laqueus californicus.
Cumingia californica.
Tapes staminea.
Lucina acutilineata.
Axinea profunda.
Acmæa mitra.
Acmæa insessa.
Fissurella volcano.

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Chlorostoma Pfeifferi.
Surcula Carpenteriana.
Conus californicus.
Neverita Recluziana.
Mitra maura.
Monoceros engonatum.
Purpura crispata.
Fusus Harfordi.

Near Santa Barbara, the outcrop (C^2) upon the seabeach afforded a few fossils, some of which were similar to species obtained from the San Diego well. Among these were the following, all recent species:—

Venericardia monilicosta.
Bittium quadrifilatum.
Bittium asperum.
Lacuna vincta.
Astyris gausapata.
Amphissa versicolor.
Trophon orpheus? jun.

The formation within whose limits the beds above described are to be included extends from the Pribiloff Islands southward, at least to Yesso Island, Japan, on the west, and to Chili on the east. A fruitful locality is at Cerros Island, Lower California, from whence *Waldheimia Kennedyi* Dall, and also a number of the species referred to in the preceding article, have been obtained, some of which are described by Gabb in the Paleontology of California.

Jurassic or Cretaceous beds appear to exist at Todos, Santos Bay, Lower California, not far from San Diego. Mr. Hemphill collected here, and has presented to the National Museum, half a dozen species not yet critically examined, but containing a fine specimen belonging to the *Rudistæ*, which have hitherto been hardly known as American fossils.

MARCH 2, 1878.

A REVISION OF THE AMERICAN SPECIES OF THE GENUS BREVOORTIA, WITH A DESCRIPTION OF A NEW SPECIES FROM THE GULF OF MEXICO.

By G. BROWN GOODE.

The type of the genus *Brevoortia* of Gill is the species described in 1802 by Latrobe under the name of *Clupea tyrannus*, and later by Mitchill under the name of *Clupea menhaden*. As has been already indicated,* the former name has the prior claim to adoption, and the species must be called *Brevoortia tyrannus*. Of this species, there appear to be two geographical races or varieties. One of these is the typical form of the Atlantic coast of the United States, the other a closely allied form from the coast of Brazil, already described by Spix under the name of *Clupanodon aureus*. For the northern form, the name of Mitchill should be retained, and the two varieties may be distinguished as *Brevoortia tyrannus* var. *menhaden*, and *Brevoortia tyrannus* var. *aureus*. On the coast of Patagonia and Paraguay occurs a well-marked species described by Jenyns under the name of *Alosa pectinata*. This species is readily

* *Vide supra*, p. 8.

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distinguished by its larger scales, which are arranged in 18 to 20 lateral rows, instead of 25 to 27, as in *B. tyrannus*. The generic relations of this species were recognized many years ago by Professor Gill, and its name should stand as *Brevoortia pectinata*, (Jenyns) Gill.

A third species occurs in the Gulf of Mexico. It is distinguished by its larger head and fins. It appears to have never been described, and for this form the name *Brevoortia patronus* is proposed. It is accompanied by the same Crustacean parasite that is found in the mouths of *B. tyrannus*, to which Latrobe gave the significant specific name of *prægustator*.

Brevoortia tyrannus, (Latrobe) Goode.

Diagnosis.—Head and jaws short, the length of the head less than one-third of the length of the body, less the caudal fin, especially short in var. *aurea;* the maxillary in length much less than three-twentieths of the length of the body. Height of body about one-third of total length, in very fat individuals three-eighths. Fins comparatively short, the height of the dorsal less than length of maxillary, and considerably less than three-tenths of length of body, that of the anal usually less than half that of maxillary, that of ventral always less than one-tenth of total length, the length of middle caudal rays one-fifth that of body and less, that of exterior caudal rays usually about three-fourths, often less than two-thirds, and rarely more than five-sixths of total length. Fins all shorter in var. *aurea*. Insertion of ventral far behind tip of pectoral. Insertion of dorsal about equidistant from snout and base of middle caudal rays, but varying two or three one-hundredths to either side of the median point, and always slightly behind the vertical from insertion of ventrals.

Scales of medium size, much serrated, arranged very irregularly in 24–26 transverse and 60–80 longitudinal rows. Scales forming sheath at base of pectoral not large. Squamation of caudal lobes moderate.

Operculum strongly striated in var. *menhaden*, almost smooth in var. *aurea*.

Scapular blotch conspicuous.

This species is easily distinguished from *Brevoortia patronus* by its shorter head and fins, by its slenderer body, and its pectinated scales, and from *B. pectinata* by its smaller, less regularly arranged, and more numerous scales, and its shorter, less furcate caudal fin.

INDIVIDUAL VARIATIONS AND SPECIAL CHARACTERS.

Head.—The length of the head varies from 0.28 to 0.33. The posterior end of the maxillary extends to a point in the vertical from the centre of the orbit. The length of the skull, as indicated by the "distance from snout to nape", varies from 0.19 to 0.23. The length of snout, measured from a line drawn perpendicularly through the centre of the orbit, varies from 0.09 to 0.11. The length of maxillary varies from

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0.12 to 0.145; that of mandible from 0.15 to 0.18. The diameter of the eye enters 4½ times in the length of the head. Its width varies from 0.11 to 0.15 in very fat individuals.

Shape of Body.—This is exceedingly variable, and the variation is caused largely by the fatness of the individual. In very plump ones, the expansion of the belly throws back the origin of the ventrals and anal, and greatly changes the appearance of the fish. In the specimens before me, the height of the body ranges from 0.31 to 0.38½. The table of measurements subjoined shows the effect of increased height of body upon the other measurements of proportion.

Fins.—The range of variation in the position of the dorsal is indicated in the diagnosis. There is no appreciable correlation between the positions of the dorsal and anal in the same specimen. The insertion of the anal is distant from the snout from 0.68 to 0.75. The lengths of the rays in dorsal, anal, ventral, and caudal vary much, as the table of measurements indicates. In the caudal, the upper lobes vary from 0.16 to 0.25; the lower lobes from 0.18 to 0.27. The relation of the pectoral and ventral fins is much affected by the length of the head, the insertion of the former being thrown much further back in long-headed individuals.

Scales.—The degree of serration varies much in individuals as well as the squamation of the bases of the vertical fins and the number and regularity of the body-scales. In young individuals, the scales are arranged with much regularity; but, in adults, I have strong reason to believe that scales are intercalated here and there, throwing the arrangement into great disorder, and rendering an accurate enumeration impossible.

Varieties.—The series before me embraces some two hundred specimens of *Brevoortia tyrannus* of various ages, seasons, and localities. Almost every feature is subject to wide variations, and there is usually no decided correlation between different characters except that a long head is accompanied usually by long jaws, and a pectoral set farther back and extending more nearly to the insertion of the ventral. There are, however, certain groups of individuals which can be included within a diagnosis which may serve to distinguish them from all the others of the same species. To what extent it is desirable to define varieties which are not separated geographically, I am not well satisfied. The exact meaning of the terms "sub-species" and "variety" as employed by Cope, Coues, Gill, Yarrow, and other recent writers has not been definitely interpreted. It seems desirable, however, to designate in some way the limits of variation from the normal specific type in different directions. With this purpose, and premising that by a variety I mean simply a divergent form, connected by intermediate forms with the typical specific form, I have thought it desirable to name provisionally two varieties, and to call attention to others which may possibly exist. This is done with much hesitation, and only with a view to an attempt to

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formulate the minor differences to be observed between fish of the same species on different parts of our coast. A precisely parallel case is to be found in the shad of the different Atlantic rivers, which are well known to exhibit strong distinctive marks. Very possibly every school of menhaden has its own characteristics. In every case where I have had an opportunity to observe them, the individuals composing the same school were closely similar to each other.

The typical form of the species as now defined is taken from the coast of Southern New England and the Middle States. It has the height of the body about one-third of the total length, the head three-tenths of the total length, or a little more, the maxillary long (0.14 to 0.14½) and exceeding the height of the dorsal.

The species described by Spix under the name of *Clupanodon aureus* cannot be distinguished by any apparent specific characters from *Brevoortia tyrannus*, since one or more of the specimens of the latter species before me partake of some of the peculiarities of the Brazilian form. There is, however, a general average of characters exhibited by the Brazilian specimens as well as by the figure of Spix, with which they closely agree, which seems to me to entitle them, for the present at least, to recognition as belonging to a distinct geographical variety. The distinctive characters appear to consist in (1) a greater average height of body; (2) a lesser length of head; (3) a lesser average length of maxillary and mandible; (4) a slightly lower anal and dorsal fin; (5) a greater average distance of anal from snout; (6) a greater average length of the middle caudal rays; (7) a shorter average pectoral; (8) a more regular arrangement of the scales, and a more luxuriant growth of small scales at the bases of the fins.

A number of specimens from Noank, taken in 1874, vary quite as much from the normal type and in almost the same respect as the variety just described. The maxillary and mandible are shorter, however, than in the Brazilian form, the anal fin lower, and the lobes of the caudal are extremely short, sometimes hardly exceeding in length the pectoral fin. But for the fact that these specimens show almost all the characters of the Brazilian *Brevoortia*, and in some cases exaggerations of them, I should be inclined to consider the *aurea* a distinct species. Having with some hesitation allowed it the rank of a variety, the question must be decided as to the propriety of also allowing varietal rank to this peculiar form from Noank. The exact meaning of the terms *subspecies* and *variety* as recently employed by zoologists is not very clear to my mind, but I infer that a "variety" is composed of an assemblage of individuals varying uniformly from the typical specific form in a degree sufficient to be susceptible of description and definition, though not necessarily separated from it by the absence of connecting forms. Premising then that in giving to the Noank specimens a varietal name my object is simply to define the limits of variation from the normal

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type in a given direction, I would provisionally propose that they be designated as variety *brevicaudata*.

The specimens from the Saint John's River, Florida, are extremely variable in every respect. Certain individuals show a tendency to elongation of the head and fins, and also a slenderness of the posterior part of the body, and nearly all the individuals from that region are more lightly and gracefully shaped. They all have a tendency to a yellow coloration, especially upon the caudal lobes. I have not felt justified, however, in calling it a variety.

I have not had an opportunity to study the Maine schools, but am inclined to believe that their differences are very perceptible.

Table of Measurements.

Current number of specimen	10,405 = 709 C. A. S.		10,405 = Orig. No. 247.		20,666 *a*.	
Locality	Wood's Holl, Mass.		Wood's Holl, Mass.		Wood's Holl, Mass.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
	Very fat.		*Plump.*			
Extreme length	251	.....	243	.....	130	.....
Body:						
Greatest height	.....	38½	.....	31½	.....	34½
Least height of tail	.....	9	.....	.....	.....	.....
Length of caudal peduncle	.....	9½	.....	.....	.....	.....
Head:						
Greatest length	.....	32	.....	31	.....	31
Distance from snout to nape	.....	20	.....	20½	.....	20½
Greatest width	.....	15	.....	.....	.....	.....
Length of snout from perp. from centre of orbit	.....	10	.....	10	.....	10½
Length of operculum	.....	9	.....	9	.....	9
Length of maxillary	.....	14½	.....	14½	.....	14
Length of mandible	.....	17½	.....	17½	.....	17
Distance from snout to centre of orbit	.....	10½	.....	10½	.....	10½
Dorsal:						
Distance from snout	.....	54	.....	51	.....	49
Length of base	.....	19	.....	17½	.....	17½
Origin of pectoral to origin of dorsal	.....	41	.....	33½	.....	35½
End of dorsal to end of anal	.....	25½	.....	24	.....	25
Length of longest ray	.....	12½	.....	11	.....	12½
Length of last ray	.....	6	.....	7	.....	6½
Anal:						
Distance from snout	.....	73	.....	72	.....	72
Length of base	.....	14	.....	14½	.....	15½
Origin of anal to origin of dorsal	.....	39	.....	33	.....	36
Length of longest ray	.....	6½	.....	5½	.....	6½
Length of last ray	.....	5½	.....	4½	.....	4½
Caudal:						
Length of middle rays	.....	5½	.....	4½	.....	5½
Length of external rays, superior	.....	23	.....	20½	.....	20
inferior	.....	26½	.....	23	.....	23
Pectoral:						
Distance from snout	.....	30	.....	32	.....	30
Distance of tip from snout	.....	48½	.....	48	.....	46
Length	.....	19	.....	17½	.....	18
Length of longest axillary appendage	.....	11	.....	.....	.....	.....
Ventral:						
Distance from snout	.....	53	.....	53	.....	51
Length	.....	8½	.....	7½	.....	9
Origin of ventral to end of dorsal	.....	38	.....	31	.....	33
Dorsal rays	18	.....	20	.....	20	.....
Anal rays	21	.....	20	.....	21	.....

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Table of Measurements—Continued.

	20,666 *b*.		18,049 *b*.		1,696 *a*.	
Locality	Wood's Holl, Mass.		Saint John's River, Florida.		Indian River, Florida.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
					Fat.	
Extreme length	132		140		196	
Body:						
Greatest height		34		34		37
Head:						
Greatest length		32		30		30
Distance from snout to nape		23		21		20
Greatest width				11		
Length of snout from perp. from centre of orbit		11½		10		10
Length of operculum		9		9½		9
Length of maxillary		14½		13		13½
Length of mandible		17½		16		17
Distance from snout to centre of orbit		12				
Dorsal:						
Distance from snout		53		49		50
Length of base		19		18		17
Origin of pectoral to origin of dorsal		35		34		36
End of dorsal to end of anal		24		26		30
Length of longest ray		12		12		13
Length of last ray		6		6½		5
Anal:						
Distance from snout		72		71		72
Length of base		15		16		16
Origin of anal to origin of dorsal		34		36		38
Length of longest ray		6½		8		*5+
Length of last ray		5		5		*3+
Caudal:						
Length of middle rays		6		6½		*4+
Length of external rays, superior		22½		24		*22
inferior		27		27		*24
Pectoral:						
Distance from snout		32		30		30
Distance of tip from snout		48½		47		
Length of longest axillary appendage		18		17		
Ventral:						
Distance from snout		52		50		50
Length		9½		9		
Origin of ventral to end of dorsal		33		33		35
Dorsal rays	20		19		18	
Anal rays	21		20		20	

	5,152.		17,927.		19,046.	
Locality	West Florida.		Saint John's River, Florida.		Saint John's River, Florida.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	101		178		230	
Body:						
Greatest height		38		34½		32
Least height of tail				10		9
Length of caudal peduncle				8		8
Head:						
Greatest length		29		31½		33
Distance from snout to nape		20		20½		20½
Greatest width				12		12
Length of snout from perp. from centre of orbit		10		10		10½
Length of operculum		9½		9½		9½
Length of maxillary		13		14		14½
Length of mandible		15		18		18
Distance from snout to centre of orbit				11½		10½
Dorsal:						
Distance from snout		48		52		52½
Length of base		18		21		17
Origin of pectoral to origin of dorsal		36		34½		34
End of dorsal to end of anal		30		26		25
Length of longest ray				12		12
Length of last ray				5		

* Broke-

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Table of Measurements—Continued.

Current number of specimen	5,152.		17,927.		19,046.	
Locality	West Florida.		Saint John's River, Florida.		Saint John's River, Florida.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Anal:						
Distance from snout				68		72
Length of base				16		16
Origin of anal to origin of dorsal				38		32½
Length of longest ray				6½		6
Length of last ray				5		6½
Caudal:						
Length of middle rays				5		5½
Length of external rays, superior				21		20
inferior				23		24
Pectoral:						
Distance from snout				31½		32
Distance of tip from snout				49		50
Length				19		18
Length of longest axillary appendage				13		
Ventral:						
Distance from snout				49		48
Length				9		9
Origin of ventral to end of dorsal				33½		30
Dorsal rays	20		21		18 or 19	
Anal rays	21		21		21	

Current number of specimen	19,044.		18,049 *a*.		19,468.	
Locality	Saint John's River, Fla.		Saint John's River, Fla.		Virginia.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	192		144		234	
Body:						
Greatest height		34		34		32
Least height of tail						8
Length of caudal peduncle						9
Head:						
Greatest length		29		29		32½
Distance from snout to nape		19		19		20½
Greatest width		12		11		12
Width of interorbital area						7
Length of snout from perp. from centre of orbit		9½		10		10
Length of operculum		10		10		9
Length of maxillary		13		13		14
Length of mandible		16		16½		18
Distance from snout to centre of orbit		10		11		11
Dorsal:						
Distance from snout		49		49		51
Length of base		17		17		18½
Origin of pectoral to origin of dorsal		35		35		34
End of dorsal to end of anal		27		29		23
Length of longest ray		12		12½		11
Length of last ray		6		6½		5½
Anal:						
Distance from snout		71		71		72
Length of base		17		17½		14½
Origin of anal to origin of dorsal		34		37		33
Length of longest ray		6		7		5½
Length of last ray		5		4		6
Caudal:						
Length of middle rays		6		5		4
Length of external rays, superior				25		
inferior		23		27		24
Pectoral:						
Distance from snout		30		30		32
Distance of tip from snout		45		45		49
Length		16		17		18
Length of longest axillary appendage						12
Ventral:						
Distance from snout		49		50		51
Length		9		8½		9
Origin of ventral to end of dorsal		34		34		30
Dorsal rays	19		18		19	
Anal rays	23		21		21	

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Table of Measurements—Continued.

Current number of specimen	14,846 a.		14,846 b.		Var. *aurea*.	
Locality	Noank, Conn.		Noank, Conn.		M. C. Z. Rio Janeiro.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	157	.....	156	.....	236	.....
Body:						
Greatest height	.....	34	.....	34½	.....	35
Head:						
Greatest length	.....	29	.....	28	.....	27½
Distance from snout to nape	.....	20	.....	.....	.....	21
Length of snout from perp. from centre of orbit.	.....	10	.....	9	.....	10
Length of operculum	.....	9½	.....	.....	.....	.....
Length of maxillary	.....	13	.....	12	.....	12
Length of mandible	.....	14½	.....	14	.....	15
Distance from snout to centre of orbit	.....	10	.....	.....	.....	.....
Dorsal:						
Distance from snout	.....	49	.....	47	.....	51
Length of base	.....	19	.....	20	.....	.....
Origin of pectoral to origin of dorsal	.....	35	.....	34	.....	.....
End of dorsal to end of anal	.....	25	.....	25	.....	.....
Length of longest ray	.....	10	.....	9	.....	10
Length of last ray	.....	6	.....	6	.....	4
Anal:						
Distance from snout	.....	74	.....	72½	.....	73
Length of base	.....	15	.....	16	.....	.....
Origin of anal to origin of dorsal	.....	36½	.....	37	.....	.....
Length of longest ray	.....	4½	.....	5	.....	5
Length of last ray	.....	4	.....	4½	.....	4
Caudal:						
Length of middle rays	.....	4½	.....	5½	.....	5
Length of external rays, superior	.....	17	.....	16	.....	23
inferior	.....	18	.....	20½	.....	.....
Pectoral:						
Distance from snout	.....	28	.....	28	.....	28
Distance of tip from snout	.....	41	.....	43	.....	42
Length	.....	12	.....	15	.....	15
Ventral:						
Distance from snout	.....	52	.....	50	.....	49
Length	.....	7	.....	7	.....	8
Origin of ventral to end of dorsal	.....	34	.....	36	.....	.....
Dorsal rays	20	.....	20	.....	II. 17	.....
Anal rays	19	.....	20	.....	19	.....

Current number of specimen	Var. *aurea*.		Var. *aurea*.		Average of *aurea*.
Locality	M. C. Z. *a*. Sambaia, Thayer Exp.		M. C. Z. *b*. Sambaia, Thayer Exp.		
	Millim.	100ths.	Millim.	100ths.	100ths.
Extreme length	164	.....	154	.....	.....
Body:					
Greatest height	.....	37	.....	34	35
Head:					
Greatest length	.....	28	.....	29	28
Distance from snout to nape	.....	19	.....	22	21
Length of snout from perp. from centre of orbit.	.....	9	.....	10	9½
Length of maxillary	.....	13	.....	14	13
Length of mandible	.....	15	.....	17	15½
Dorsal:					
Distance from snout	.....	49	.....	48	49½
Length of longest ray	.....	12	.....	10	10½
Length of last ray	.....	5	.....	5	4½
Anal:					
Distance from snout	.....	75	.....	73	73½
Length of longest ray	.....	6	.....	5	5½
Length of last ray	.....	4	.....	3	3½
Caudal:					
Length of middle rays	.....	6	.....	5	5½
Length of external rays, superior	.....	25	.....	23	23½
Pectoral:					
Distance from snout	.....	29	.....	30	29
Distance of tip from snout	.....	44	.....	47	44½
Length	.....	16	.....	16	15½
Ventral:					
Distance from snout	.....	53	.....	52	51½
Length	.....	7	.....	7	7½
Dorsal rays	II. 17	.....	II. 17	.....	.....
Anal rays	20	.....	22	.....	.....

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Brevoortia pectinata, (Jenyns) Gill.

Diagnosis.—Proportions of *head* and jaws as in *B. tyrannus*. *Height of body* almost three-eighths of total length, and greater proportionally than in *B. tyrannus*. *Fins* nearly as in *B. tyrannus*, but uniformly averaging slightly more; the height of the dorsal somewhat less than three-twentieths of total length; that of the anal equal to or slightly less than half the length of the maxillary. The caudal fin is somewhat longer and more furcate, the length of the external rays never being less than five-sixths of the length of the head, while that of the medial rays remains proportionally the same as in the species first described. Insertion of ventral somewhat behind tip of pectoral, this fin and the dorsal being uniformly somewhat farther back than in *B. tyrannus*; the insertion of the latter from one to four one-hundredths posterior to a point equidistant from the snout and the base of the median caudal rays, and, as in *B. tyrannus*, behind the vertical from the insertion of the ventrals.

Scales very large, considerably serrated, and arranged regularly in 18 to 20 transverse and 50 longitudinal rows. Scales forming sheath at base of pectoral not large. Operculum smooth, or with inconspicuous and few striations. Squamation upon lobes of caudal extensive and conspicuous.

Variations.—The variations in the individual specimens studied are not of great importance, and are indicated in the table of measurements.

Table of Measurements.

Current number of specimen	1709.		M. C. Z. *a*.		M. C. Z. *b*.		Average.
Locality	Paraguay.		Rio Grande.		Rio Grande.		
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.	100ths.
Extreme length	250		224		309		
Body:							
Greatest height		36		36½		36	36
Head:							
Greatest length		33		30		30	31
Distance from snout to nape		21		21		21	21
Length of maxillary		14½		13		14	14
Length of mandible		18		16		16½	17
Dorsal:							
Distance from snout		54		53		51	52½
Length of longest ray		12½		12		12	12
Length of last ray		6		6		6	6
Anal:							
Distance from snout		70½		70		72	71
Length of longest ray		7		6		5	6
Length of last ray		6		4		4	4½
Caudal:							
Length of middle rays		6½		6		6	6
Length of external rays, superior		24+		25		25	25
inferior		26		27		28	27
Pectoral:							
Distance from snout		32		29		30	30½
Distance of tip from snout		50		47		47	48
Length		18		17		18	17½
Ventral:							
Distance from snout		51½		48		49	49½
Length		9½		8		8½	8½
Dorsal rays	II. 17		II. 17		II. 17		
Anal rays	I. 21		I. 20		I. 20		
Number of scales in lateral line	abt. 50		49		49		
Number of transverse rows	abt. 20		20		20		

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Brevoortia patronus, *sp. nov.*, Goode.

Diagnosis.—*Head* larger than in the other American forms, its length usually more than one-third that of the body, the maxillary about three-twentieths of the length of the body. *Height* of body always more than three-eighths of its total length, its anterior inferior profile cultrate, convex, giving an obtusely rounded profile to the subpectoral outline, and throwing the snout above the median horizontal axis of the body. *Fins* long and powerful; the height of the dorsal usually equal to the length of the maxillary, and about three-tenths of total length of body; that of the anal equal to or greater than half the length of the maxillary; that of the ventral one-tenth of body-length; length of middle caudal rays always more than one-fifth and often more than one-fourth the length of the head, that of the exterior rays almost equal in length to the head and rarely less than five-sixths of its length. Insertion of the ventral under or slightly posterior to the tip of the pectoral. Insertion of dorsal always posterior to a point on the dorsal outline, equidistant from the snout and the base of the medial caudal rays (sometimes as much as seven one-hundredths of total length), and always in advance of the vertical from the insertion of the ventrals.

Scales of medium size, with entire, fluted margins, arranged regularly (in young) in 24 to 25 transvere and 50 to 70 longitudinal rows. Scales forming sheath at base of pectoral very large, round. Squamation of caudal lobes inconspicuous. Axillary appendages large. Operculum smooth or very delicately striated. Scapular blotch inconspicuous.

The variations of individuals are sufficiently indicated in the subjoined table of measurements. The most characteristic specimens occur at Brazos Santiago, Tex., and the more northern specimens show a tendency to shortening up of the head, jaws, and fins.

*Description.**—The body is much compressed, especially below and in advance of the pectorals; the contour of the belly between the ventrals and the gill-opening is cultrate, projecting, obtusely rounded. The height of the body equals two-fifths of its length, and the least height of the body at the tail is one-fourth of its greatest height in front of the pectorals. The length of the caudal peduncle, from the end of the anal to the base of the exterior lobes of the caudal, is one-fifth of the height of the body, and one-twelfth (0.08) of its length.

The head is elongated and large, triangular; its length is more than one-third (0.35 and 0.34) that of the body, and its height at the nape is slightly more than its length. The length of the skull, as indicated by the distance from snout to nape, is about one-fourth (0.24 and 0.24½) of the length of the body, and the greatest width of the head (0.13) slightly exceeds the half of this. The width of the interorbital is about equal to the diameter of the orbit, and slightly more than one-fourth the length of the head. The maxillary reaches to the vertical from the posterior margin

* To avoid confusion, this is drawn up from the Brazos Santiago specimens, which are most characteristically developed.

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of the pupil; the mandible nearly to the vertical from the posterior margin of the orbit. The length of the maxillary is about equal to that of the longest ray of the dorsal fin (0.15 to 0.16), that of the mandible (0.19) half the distance from the origin of the anal to the origin of the dorsal (0.38) or to the length of the base of the anal (0.18). The distance from the tip of the snout to the centre of the orbit (0.13 to 0.13¾) equals the greatest width of the head. The length of the operculum is equal to that of the eye: the opercular striations are fine, but distinct and numerous. The dorsal fin is inserted posteriorly to a point equidistant from the snout and the base of the caudal and in advance of the vertical from the insertion of the ventrals. Its length of base (0.20 to 0.21½) is double that of the operculum. Its greatest height is nearly half the length of the head. It is composed of 19 rays, of which the third is the longest. Its upper edge is slightly emarginated. The height of the last ray (0.10) is equal to half the length of the base.

The distance of the anal from the snout is slightly less than three-fourths of the length of the body (0.70–0.72), its length of base (0.18–0.18½) one-fourth of this distance. The distance from the origin of the pectoral to the origin of the dorsal (0.37–0.37½) is about equal to that from the origin of the anal to that of the dorsal (0.38). Its height (.09–.09½) is about half its length of base, its least height (at last ray) one-third of the same (.06–.05½). The fin is composed of 22 rays, its edges slightly emarginated.

The caudal fin is much forked and elongate, the middle caudal rays (0.08) half the length of the maxillary, the exterior rays above (0.31–0.32) twice that length, the lower exterior rays (0.35–0.34) nearly equal to twice the length of the mandible.

The pectoral fin is strong, falcate, inserted under the angle of the suboperculum, at a distance from the snout (0.35–0.34) about midway to the insertion of the anal. Its tip extends beyond the insertion of the ventrals, its length (0.22) being nearly two-thirds that of the head. The axillary appendages are half as long as the fin, or more.

The distance of the ventral from the snout (0.54–0.55) is about the same as that of the dorsal, though by the contour of the body it is thrown slightly behind the point of dorsal origin. Its length (0.10) is equal to that of the last ray of the dorsal.

The scales are quite regularly arranged in about 24 to 25 horizontal and 50 vertical rows. Their free portion is narrow and high. They are entire at the edges, and fluted or crenulated. There are two rows of differentiated scales upon each side of the dorsal line, but they are scarcely pectinated. The scales forming the sheath at the base of the pectoral are large and round.

Color.—Silvery, with a brassy sheen upon the sides and greenish gray upon the back.

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Table of Measurements.

Current number of specimen	892 *a*.		892 *b*.		891 *a*.		891 *b*.	
Locality	Brazos Santiago Texas.		Brazos Santiago, Texas.		Mouth of Rio Grande.		Mouth of Rio Grande.	
	Millim.	100ths.	Millim.	100ths.	Millim	100ths.	Millim.	100ths.
Extreme length	106	.....	104	.....	96	.....	90	.....
Body:								
Greatest height	.....	40⅜	.....	40½	.....	38	.....	41⅛
Least height of tail	.....	11	.....	10	.....	10	.....	11
Length of caudal peduncle	.....	8	.....	8	.....	.....	.....	7⅛
Head:								
Greatest length	.....	35	.....	34	.....	33	.....	33
Distance from snout to nape	.....	24⅞	.....	24	.....	23½	.....	23
Greatest width	.....	13	.....	13	.....	11	.....	11
Length of snout from perp. from centre of orbit	.....	12	.....	11⅛	.....	12	.....	11
Length of operculum	.....	10	.....	10	.....	11	.....	12
Length of maxillary	.....	16	.....	15⅞	.....	16	.....	14⅛
Length of mandible	.....	19	.....	18⅛	.....	19	.....	18
Distance from snout to centre of orbit	.....	13⅛	.....	13	.....	12⅛	.....	13
Dorsal:								
Distance from snout	.....	53	.....	53⅛	.....	51	.....	52
Length of base	.....	21½	.....	20	.....	17	.....	19
Origin of pectoral to origin of dorsal	.....	37	.....	37⅓	.....	37	.....	39
End of dorsal to end of anal	.....	25	.....	26	.....	26	.....	28
Length of longest ray	.....	15	.....	16	.....	14⅛	.....	17
Length of last ray	.....	10	.....	9	.....	7⅛	.....	9
Anal:								
Distance from snout	.....	72	.....	70	.....	70⅛	.....	69
Length of base	.....	18½	.....	18	.....	19	.....	20
Origin of anal to origin of dorsal	.....	38	.....	38	.....	36	.....	39
Length of longest ray	.....	9	.....	9⅛	.....	7⅛	.....	8⅛
Length of last ray	.....	6	.....	5⅛	.....	5	.....	4⅛
Caudal:								
Length of middle rays	.....	8	.....	8	.....	8	.....	7
Length of external rays, superior	.....	.....	.....	.....	.....	26	.....	25+
inferior	.....	31	.....	32	.....	28	.....	27+
Pectoral:								
Distance from snout	.....	35	.....	34	.....	33⅛	.....	32
Distance of tip from snout	.....	55	.....	54	.....	53	.....	52
Length	.....	22	.....	22	.....	18⅛	.....	20
Length of longest axillary appendage	.....	11	.....	13	.....	.....	.....	.....
Ventral:								
Distance from snout	.....	53	.....	52	.....	54	.....	51
Length	.....	10	.....	10	.....	10	.....	9⅛
Origin of ventral to end of dorsal	.....	36	.....	35	.....	33	.....	35
Dorsal rays	19	.....	19	.....	18	.....	18	.....
Anal rays	22	.....	22	.....	23	.....	22	.....
Number of scales in lateral line	47 to 50	.....	47 to 50	.....	abt. 65	.....	abt. 65	.....

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Table of Measurements—Continued.

Current number of specimen	891 *c*.		5,864 *a*.		5,864 *b*.		5864 *c*.	
Locality	Mouth of Rio Grande.							
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Extreme length	73		86		81		74	
Body:								
Greatest height		40		38		36		38½
Head:								
Greatest length		30		32		30		33
Distance from snout to nape		22½		23		21½		24
Length of snout from perp. from centre of orbit		11½		12		10		11
Length of operculum		10		10		10		10
Length of maxillary		14		14		13½		14½
Length of mandible		17½		17		16		17½
Distance from snout to centre of orbit		12						
Dorsal:								
Distance from snout		57		50		57		52
Length of base		17		16		18½		19
Origin of pectoral to origin of dorsal		37		36		33		36
End of dorsal to end of anal		27		31		26		25
Length of longest ray		14		14		12		14
Length of last ray		7		8		5½		7
Anal:								
Distance from snout		69		72		70		70½
Length of base		19		19		17		19
Origin of anal to origin of dorsal		37		37		36		37
Length of longest ray		7		impf. 7		6		9
Length of last ray		5		impf. 5		4		6
Caudal:								
Length of middle rays		9		7		6		9½
Length of external rays, superior		27		27				
inferior		27		30		25		
Pectoral:								
Distance from snout		30		33		30		32
Distance of tip from snout		47		48		47		50
Length		17		18		17		19
Ventral:								
Distance from snout		52		53		53		52
Length		10		9		8		10
Origin of ventral to end of dorsal		36		32		32		35
Dorsal rays	18		19		18		19	
Anal rays	21		22		20		21	
Number of scales in lateral line	65 or more.		abt. 70		abt. 55		abt. 55	

DESCRIPTION OF CAULOLATILUS MICROPS, A NEW SPECIES OF FISH FROM THE GULF COAST OF FLORIDA.

By G. BROWN GOODE and TARLETON H. BEAN.

The Smithsonian Institution has received from Mr. Silas Stearns, of the Pensacola Ice Company, Pensacola, Fla., a fish new to the fauna of the United States, and believed to be new to science. This fish was taken March 18, 1878, on the Snapper Bank, off Pensacola, in 35 fathoms of water. It was packed in ice, and arrived in good condition, March 22, at the National Museum, where it was cast in plaster, and sketched by Mr. Shindler. It is now a fine alcoholic specimen, No. 20,971 of the Fish Catalogue.

Caulolatilus microps is related to the Brazilian form *Caulolatilus chrysops* (Cuvier and Valenciennes) Gill, and the Cuban form *Caulolatilus cyanops* Poey, described in 1867.* Of the former, two specimens only

* Repertorio Físico-Natural de la Isla de Cuba, i, p. 312.

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are recorded: one, the type of the original description, one foot long, collected on the coast of Brazil by M. Gay, and probably now in the Museum in Paris; a second in the British Museum, a stuffed specimen, purporting to have been collected in the West Indies. Of Poey's *C. cyanops* the National Museum possesses a fine specimen (Cat. No. 4750), 15 inches long, collected and presented by Professor Poey.

The Pensacola specimen, now under consideration, is two feet and three inches long, weighing nine pounds and one-quarter. Its color has faded, but a yellow blotch is still visible under the eye, similar to that mentioned in *C. chrysops*. A dark blotch is visible in and above the axilla of the pectoral.

The following diagnosis is believed to characterize the peculiarities of the new form. It is accompanied by a table showing the detailed measurements of *C. cyanops* and *C. microps*, and another showing the relations of *C. chrysops* as far as they can be gleaned from the published descriptions.

Caulolatilus microps, *sp. nov.*, Goode and Bean.

Diagnosis.—Height of body contained slightly more than three and one-half times in its length, its width seven times, the species being higher and more robust than *C. chrysops* and *C. cyanops*. Length of head equal to height of body, being in same proportion to total length as in *C. cyanops* (though less in proportion to height of body), and longer proportionally than in *C. chrysops*. Width of interorbital area equal to half the length of snout, instead of four-fifths, as in *C. cyanops*. Length of snout greater than that of maxillary. Diameter of eye contained six times in length of head, instead of four times, as in *C. chrysops*, and three and three-fourths times, as in *C. cyanops*. Nostrils midway from eye to snout, and separated by a distance equal to diameter of eye. Dentition much as in *C. cyanops*. Fins all shorter than in *C. cyanops*, the anal and soft dorsal two-thirds as high. Caudal fin slightly emarginate. Pectoral not extending to first ray of anal, as in the other species, less than one-fourth of total length. Scales in lateral line 120, in transverse line 48, being smaller and more numerous than in *C. cyanops*.

Radial Formula.—D. VII, 25; A. I, 23; C. 17; P. I, 16; V. I, 5, instead of D. VII, 24; A. I, 22; C. 19; P. I, 15; V. I, 5, as in *C. cyanops*, or D. VIII, 24; A. II, 22; C. 17; P. 17; V. I, 5, as in *C. chrysops*.

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Table of Measurements.

Current number of specimen	*Caulolatilus microps*, 20,971.		*Caulolatilus cyanops*, 4,750.	
Locality	Pensacola, Fla.		Cuba.	
	Millim.	100ths.	Millim.	100ths.
	Fresh specimen.		*Alcoholic specimen.*	
Extreme length	690		330	
Length to end of middle caudal rays	690		365	
Body:				
Greatest height		28		24⅛
Greatest width		14⅛		12
Height at ventrals		28		24⅛
Least height of tail		8		7
Length of caudal peduncle		10		11
Head:				
Greatest length		28		28
Distance from snout to nape				15
Greatest width		14		13½
Width of interorbital area		7		8⅛
Length of snout		14		10
Length of maxillary		12½		10½
Length of mandible		13		12½
Distance from snout to centre of orbit		14½		11
Diameter of orbit		4⅛		7⅛
Dorsal (*spinous*):				
Distance from snout		34		32⅛
Length of base		12⅛		13
Greatest height		7⅛		8
Length of first spine		3⅛		5
Length of second spine		5½		6
Length of last spine		7⅛		9⅛
Dorsal (*soft*):				
Length of base		44⅛		46
Length of first ray		7		10⅛
Length of longest ray		8⅛	(22d)	13
Length of last ray		4⅛		5
Anal:				
Distance from snout		55		51⅛
Length of base		35⅛		31⅛
Length of antecedent spine		3		3
Length of first ray		6		7⅛
Length of longest ray	(9th)	8⅛	(11th)	12
Length of last ray		4⅛		5
Caudal:				
Length of middle rays		11⅛		11
Length of external rays		16		17⅛
Pectoral:				
Distance from snout		30⅛		27⅛
Length		23		26
Ventral:				
Distance from snout		34⅛		31
Length		14		16
Branchiostegals	VI		VI	
Dorsal	VII–25		VII–24	
Anal	I–23		I–22	
Caudal	17		19	
Pectoral	I–16		I–15	
Ventral	I– 5		I– 5	
Number of scales in lateral line	abt. 190		108	
Number of transverse rows above lateral line	13		10	
Number of transverse rows below lateral line	35		25	

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Table showing Comparative Proportions of Atlantic Species of CAULOLATILUS.

	*C. chrysops.**	*C. cyanops.*	*C. microps.*
Height of body in total length	4½	4½	3½
Width of body in total length	10	8½	7
Head in total length	4½	3½	3½
Interorbital width in total length		12	14½
Snout in total length		10	7½
Upper jaw in total length		10	8
Snout to orbit in total length		9	7
Eye in head	4	3½	6
Nostrils	Near eye	½ distance from anout to eye.	Midway from snout to eye.
He'ght of dorsal in total length (of body)		12½	13½
Anal			Farther from snout than in *cyanops*, and two-thirds as high.
Caudal			Less emarginate than in the other species.
Pectoral	Extends to first anal ray.	Extends to first anal ray.	Does not reach first anal ray.
Scales in lateral line	110+	108	120
Transverse rows of scales		35 (10+25)	48 (13+35)

* These proportionate measurements, as taken from the "Histoire Naturelle des Poissons", doubtless have reference to extreme length to end of external caudal rays. In this genus, however, the difference thus admitted is not extremely large.

APRIL 30, 1878.

THE OCCURRENCE OF HIPPOCAMPUS ANTIQUORUM, OR AN ALLIED FORM, ON SAINT GEORGE'S BANKS.

By G. BROWN GOODE.

A specimen of *Hippocampus*, measuring about five inches, was procured by the United States Fish Commission from a mackerel schooner, which had captured it, in company with a school of mackerel, on Saint George's Banks, in August, 1873. It was kept alive for some days, and an interesting fact was observed with regard to its habits, its tail apparently not being used for prehension. This specimen agrees very closely with *H. antiquorum* as described by Günther, and is provisionally referred to that species; it does not agree with the description and figure of *H. hudsonius*, DeKay, a species which has never been accurately defined, and which may prove identical with *H. guttulatus*, Cuv.

H. antiquorum is, then, an addition to the fauna of Eastern North America. The geographical range of the species is very wide; it has been recorded from the English coast, the Mediterranean at Malta and other points, Fernando Po, Japan, and Australia. Several specimens were collected in Bermuda in 1872 and 1877 in company with *H. guttulatus*.

A specimen received by Storer from Holmes's Hole was, in his first report, referred to *H. brevirostris*, Cuv., which is synonymous, according to Günther, with *H. antiquorum*. Storer afterward adopted the name proposed by DeKay, but his description and figure refer to a form more nearly resembling that now under consideration.

The following notes were taken from the fresh specimen, the colors while it was living:—

No. 21044, U. S. Nat. Mus. Cat. Fish.

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Body rings, 1 + 10. Caudal rings, 37. Tubercles of body and tail elongated, slightly recurved, usually prolonged into slender filaments; those on the 2d, 4th, and 6th body rings much larger than the others; tubercles prominent and filamentose upon the 4th, 6th, 9th, 12th, 16th, and 20th caudal rings. Ventral tubercles upon 6th, 7th, 8th, and 9th body rings. Occipital crest very high, with five prominent tubercles, the anterior two with long filaments. Length of snout equal to distance from posterior margin of orbit to gill-opening. Operculum marked with fine, radiating striæ.

Radial formula.—D. 19 (the first imperfect). P. 18. V. 4.

Color.—Yellowish-brown; the eyes and cheeks covered with radiating, wavy lines of light brown. Snout encircled by a narrow, undulating, white band near its middle.

The Commission has an accurate sketch by Mr. Emerton.

APRIL 30, 1878.

DESCRIPTIONS OF NEW SPECIES OF SHELLS FROM CALIFORNIA IN THE COLLECTIONS OF THE NATIONAL MUSEUM.

By W. H. DALL.

Haliotis (? var.) assimilis, n. s.

Shell solid, strong, not very thick, with a rather light pink, white and greenish nacre, usually with five open holes; spire more elevated than that of any other Californian species, consisting of two and a half or three whorls; aperture very oblique in adult specimens, the thickened margin of the columella narrow, somewhat concave, inclined sharply inward and upward, about three-fourths as long as the columellar side, of the aperture. Between the row of openings and the columellar edge, the space is unusually broad, marked midway by an obtuse carina, separated from the row of holes by a shallow channel; surface reddish or dull greenish, with rather rough, crowded, unequal, spiral ribs and rounded, irregular, wavy, radiating undulations crossing the spiral sculpture obliquely. The muscular impression, in most specimens, is but lightly marked, and, except for occasional spot-like impressions, is smoothly nacreous, like the rest of the interior. Lon. 4.5 in. Lat. 3.0 in. Alt. of spire 1.5 to 2.0 in. Aperture 3 inches wide and 3.75 long, in an adult specimen.

Habitat.—Monterey; San Diego, Cal.; in deep water only; thrown up by heavy storms, usually dead and worn when found and everywhere rare. Mus. Cat. 31267.

This species, or variety, has long been known to me and to most Californian collections, but has not hitherto been characterized, owing to the dead condition of most of the specimens found. Mr. Hemphill having forwarded two fresh specimens, it seems well to put it on record.

The form is different from any other Californian species; the spiral

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sculpture is that of *H. rufescens;* the radiating sculpture, except that it is not sharp or imbricated, recalls *H. corrugatus*, and the nacre is similar but less bright. These characters suggest the possibility of its being a hybrid between *H. corrugatus* and *rufescens;* but if this be the case, why should it not have a similar habitat? Those two species are littoral, but this is exclusively deep-water. I have received it from Dr. Canfield, Mrs. Capt. Lambert, and others, in past years, and have examined some twenty specimens of all ages.

Acmæa (scabra var.?) Mörchii, n. s.

Shell conical, much elevated, with a sub-central recurved apex resembling that of *Helcion pectinatus* covered with close-set, rough, imbricated ribs and riblets, the coarse, imbricated, sharp lines of growth forming with the other sculpture a close reticulation in some specimens. Interior with a brown-mottled spectrum and margin, otherwise white; exterior dull grayish or greenish speckled. The imbrications on the principal ribs very strong, in some specimens forming small spines concave beneath. Lat. 16^{mm}. Lon. 20^{mm}. Alt. 10^{mm}.

Tomales Bay, California, Hemphill, 16 specimens. Mus. Cat. 31268.

This very peculiar form has the sculpture of *A. scabra*, but much exaggerated, and very nearly the profile of *Helcion pectinatus*. The recurved apex recalls that of *A. persona*. It would not be referred to any described Californian species if its characters, as they appear, were the only test. But it is almost certain that all the species of Limpets and *Siphonariæ*, which have this peculiar elevated shape, acquire it from a particular habitat which they seem to prefer. This may be the stem of a large *Fucus*, a shell, round pebble, or what not, as in the case of those species of *Acmæa* usually (but wrongly) termed *Nacella* by Californian conchologists: *Acmæa asmi; Liriola subspiralis;* etc. They all have a flattened or normal variety, though this is often very rare.

Hence I consider the elevated form and pointed apex as probably due to a peculiar habitat, as in the other cases; a view which is borne out by a peculiar arcuation of the margin in most of the specimens, as if the creature had lived on a round shell or pebble.

Eliminating the elevation as a permanent character, the shell, apparently very limited in its distribution, might well be a hybrid between *A. scabra* and *A. persona*. Whether this be the case or not, it is a very remarkable form, and well deserves a name, even if only of varietal value. We owe its discovery to Mr. Hemphill's industry and eminent abilities as a collector.

April 30, 1878.

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CATALOGUE OF THE BIRDS OF DOMINICA FROM COLLECTIONS MADE FOR THE SMITHSONIAN INSTITUTION BY FREDERICK A. OBER, TOGETHER WITH HIS NOTES AND OBSERVATIONS.

By GEORGE N. LAWRENCE.

In the Annals of the New York Academy of Sciences, vol. 1, p. 46, I called attention to the explorations in the Lesser Antilles that were being made by Mr. F. A. Ober, giving an account of his progress up to that time in the island of Dominica, and stating that when his final collection from there was received, a catalogue of the birds obtained and noticed by him would be published.

When his last collection came to hand, it was found that the publication of the promised catalogue would be delayed; it was therefore deemed best to give a provisional list of the species in Forest and Stream; this appeared in the issue of December 6, 1877.

On his second visit to Dominica, Mr. Ober had an attack of fever, which debarred him from concluding his explorations satisfactorily. Several species that were seen by him, but not procured, he was able to identify. A few other birds were heard of, but the descriptions given of them were insufficient for their identification; these being undoubted inhabitants of the island are included in the catalogue, with such information as he could obtain concerning them. Some of these species Mr. Ober hopes to have procured for him by residents, who promised to make efforts to do so.

Mr. Ober is entitled to much credit for his industry and perseverance thus far, and his notes testify that his heart is in the enterprise.

Besides birds, he has sent valuable collections in other branches of science.

I have received from him, by way of introduction to this catalogue, the following interesting account of the physical features of Dominica, with incidents of his movements, localities where birds were procured, etc.

All of his communications and notes are designated by quotation-marks.

The arrangement of this catalogue is the same as that of the Nomenclator Avium Neotropicalium, by Messrs. Sclater and Salvin.

"The island of Dominica is 25 miles in length by 16 in breadth. It is mountainous in character, consisting of a central ridge running north and south, from which chain project hills and spurs east and west; thus the entire island is but a succession of hills and valleys, the latter ever narrowing into ravines and gorges, from which pour foaming streams and torrents.

"The coast-line is for the greater part bold and precipitous, some of the hills slope gently to the sea, and some of the valleys open upon spacious bays, which, though not deep, afford good anchorage on the Caribbean side for small craft. From the volcanic nature of this island,

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being thrust up from the great ocean bed, the water all around it is of great depth, and vessels anchoring off Roseau, the principal town, often run out sixty fathoms of chain before bringing up.

"Thus when I speak of the small depth of the bays, I mean the small indentations they make in the general line of the shore. The valleys and low hills of the Caribbean shore are tolerably well cultivated, principally in sugar-cane; the provision ground of the negroes reaching often to high hill-tops.

"On the east or Atlantic side, called the 'windward' side of the island (from the fact that the prevailing wind here is the northeast trade), are a few fine, though isolated, sugar estates, situated where deep bays give opportunity for boats to land. The nature of the east side of the island is more rocky, and the seas more boisterous than the west or Caribbean slope. The almost unceasing trade-wind keeps the Atlantic in a tumult, in striking contrast to the calms of the Caribbean waters.

"As this island is about midway the group known as the Lesser Antilles, being in lat. 15° 20′ — 15° 45′; long. 61° 13′ — 61° 30′, it possesses much in its fauna that will prove of interest; and doubtless some species will be found to inhabit it that exist neither north nor south of it; some that are found north but not south, and *vice versa*. Possessing as it does the highest mountain peak in any island south of Jamaica, and a range of mountains and hills of 2,000 to 3,000 feet in height, the essential character of the fauna is mountainous. In fact, along the coast and in the low valleys, very few birds are obtained more than the ordinary sparrows, hummingbirds, etc. Though not rich in either numbers or species, Dominica contains its best birds in high mountain valleys. Each kind has its characteristic haunt and breeding place, as will be described hereafter, and the majority of them are in the mountains and mountain valleys.

"My first collecting ground was at Landat (see Forest and Stream), a mountain vale 1,500 feet above the Caribbean Sea, at the head of the Roseau Valley, which latter made up into the mountains from the sea for nearly five miles. The average temperature of this region was ten degrees lower than at Roseau, 1,500 feet below; at night a blanket (sometimes two) was necessary. I collected here for a month—the month of March—during which period I visited the famous Boiling Lake, a chain of lakes on the mountains, the near mountain peaks, and thoroughly explored every accessible ravine and valley within a day's walk.

"After shipping my collections to the Smithsonian, I started for the central 'windward' portion of the island, where reside the last vestiges of the Carib Indians. With them I resided six weeks, in a cabin close by the Atlantic shore. It was while there that I procured the Imperial Parrot, and other birds of less note, by making forced marches into the high mountains.

"I should note here that everything I needed had to be transported

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over the rugged mountain trails, from the town of Roseau, a journey of a day and night, upon the heads of men and women.

"In May I returned to Roseau. In June I passed a week in Landat, finding little difference in the birds, except in the scarcity of the Hummingbirds and a few others. I also spent more than a week, in June, at Batalie, a lime plantation midway the west coast, where I found a few birds which I had seen in the mountains more abundant, and one species—the Tropic Bird—breeding in the cliffs.

"During May and June I was exhausted by a low type of fever, the result of exposure, which greatly retarded my efforts to secure greater numbers of birds. From subsequent observation, however, and enquiry, I am certain that nearly all the resident species have been obtained. The very few not procured will be noticed further on.

"On the 15th September I returned to Dominica, after a visit to some of the northern islands. Making my way at once to the mountains, I had opportunity to note the changes that the seasons would make in the time which had elapsed since my first visit. The Hummingbirds were in great abundance, the 'Mountain Whistler' nearly silent, and *perdu;* the Flycatchers same as usual; Wrens about the same, but more in the deep woods; sparrows, finches, etc., in customary abundance; the 'game birds'—'Perdix', 'Ramier', and 'Tourterelles'—in abundance.

"During this visit I succeeded in procuring the only species of Owl known in Dominica. The first was a female, September 18, sitting upon its nest, which contained three eggs freshly laid. The following day brought in the male; this was the only find of value.

"Strange to say, my old enemy, fever, visited me again, the first night I spent in the mountains; though I had been exempt from it for two months, and my last visit there had aided in its cure. This discouraging welcome to Dominica (I do not, though, attribute it solely to the climate) prevented me from going out on a projected trip to the mountains beyond for the Parrot; I sent my men but they failed to get the bird.

"The migratory species had arrived in small numbers—Golden Plover, Sandpiper, etc.—and the water of Roseau Bay was black in places with large flocks of the 'twa-oo', a species of tern. These birds only come before a gale and are harbingers of a storm. September being a hurricane month, very few sailing craft of any kind were about; being, especially in the French islands, hauled up, to remain so through October.

"Much to my regret, I was unable to procure the Parrot, but little larger than our Carolina Parrot, and the 'Diablotin'. The latter was, twenty years ago, in great abundance, breeding in the mountains; but of late years it has become so scarce as to appear almost mythical. Its disappearance is attributed to the depredations of the 'Manacon', a worthless marsupial animal, introduced into Dominica years ago. Although the Diablotin is, probably, identical with the Petrel found in the Blue Mountains of Jamaica (the *Prion Caribbœa*, as suggested by

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Prof. Baird); yet it would be very interesting to know exactly what it is. If it is possibly remaining, I have hopes of securing it, as my friend H. A. Alford Nicholls, M. D., of Roseau, has offered a large reward for it; if obtained, to be sent to the Smithsonian.

"Having been in the island during the breeding season, I procured many nests and eggs, which are, probably, little known. Nests and eggs of three species of Hummingbirds, the 'Perdix', Owl, and many smaller birds, were received.

"There are few sea-birds resident here, or even visitors for the purpose of incubation, owing to the precipitous character of the coast, and the absence of small islands or detached rocky islets.

"From Dominica I sailed south to St. Vincent, where I remain at this present writing (October).

"Trusting you will make allowance for the many imperfections in this (necessarily) hasty sketch; and hoping to give you full and perfect descriptions when I have leisure to elaborate my notes,

"I remain, faithfully yours,

"FREDERICK A. OBER.

"It would be wrong in me to conclude without acknowledging the obligations I am under to a few gentlemen of Dominica.

"To the President of the island, C. M. Eldridge, Esq., for kindly letters of introduction to other islands; for much proffered aid and a great deal of information.

"To Dr. Imray, the oldest medical man in the island, one who has done much to develope the natural resources of Dominica; a botanist of repute, especially an authority on Tropical plants, to him I am indebted for many favors. Free access to a large and well-selected library was one of the many delights his generous nature afforded me.

"To the Hon. William Stedman, for many and delicate acts of kindness.

"To Dr. H. A. Alford Nicholls, for numerous favors. I never can repay the debt I owe these two gentlemen, for the many and continued attentions during my stay. At the time when I was sick with fever, it was to the attentions of the one and the skilful medical attendance of the other, that my rapid recovery was due. The period of convalescence, passed principally in their society, will continue a very pleasant remembrance.

"The information possessed by Dr. Nicholls upon wood and mountain life was freely placed at my disposal, and it was owing chiefly to his suggestions, that my collecting grounds were so judiciously chosen as to comprise within their areas the characteristic birds of the island. Upon botany and ethnology the doctor is well informed, and his collections and herbarium promise to become very valuable.

"These remarks will perhaps account for my protracted stay in the island, and for a lingering regret at leaving it."

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Fam. TURDIDÆ.

1. Margarops herminieri (Lafr.).—Local name, "Morer".

"This curious bird inhabits the high woods; especially does it delight in the comparatively open places beneath the towering *gomier* trees, where perhaps a narrow trail has left the ground bare of leaves. There you will find where it has been scratching with its strong feet. It is very shy, and being very good as food it is sought by the mountaineers, who call it to them by imitating its cry of distress.

"Iris tea-color. Not abundant.

"Length, ♂, 9 in.; alar extent, 15; wing, 5; tail, 3½."

Of this fine species there are five males in the collection, but no females, and Mr. Ober makes no allusion to their plumage. It has not before been recorded from Dominica.

2. Margarops densirostris (Vieill.).—Local name, "Gros Grive".

"These birds are much esteemed for their flesh, and are hunted without mercy, when the law allows. They are thus made very shy; at St. Marie, however, in the Indian section of Dominica, where they are not shot, they are very tame, and frequent the mango and bread-fruit trees about the habitations of the people. They lay in April and May.

"Iris very pale straw color; bill horn color.

"Length, ♂, 11 in.; alar extent, 17½; wing, 5½; tail, 5¾."

The sexes do not differ apparently in size or plumage; not before noted from Dominica.

3. Margarops montanus (Vieill.).—Local name, "Grive".

"Abundant, but much reduced in numbers by being shot for food. In habits and actions much resembles the American Mockingbird, without his song, however.

"Iris yellow.

"Length, ♂, 9½; alar extent, 14¾; wing, 4¾; tail, 4."

Numerous specimens of both sexes sent; no apparent difference between them; also not sent before from this island.

The nest of this species is composed of fine roots loosely woven together; the inside with the smallest roots, but no soft lining; it is very shallow, and appears small for the size of the bird, having a diameter of but four and a half inches; there are two eggs of a uniform beautiful aqua-marine blue, measuring 1.20 × .75.

Collected at Shawford Valley, May 10.

4. Cinclocerthia ruficauda, Gould.—Local name, "Trembleur".

"Its name is given from its habit of quivering its wings. Abundant in the mountains and lower valleys. (See letter in Forest and Stream.)

"Length, ♂, 9 in.; alar extent, 12½; wing, 4; tail, 3½."

The sexes are alike in colors and dimensions. This species has not been obtained before in Dominica.

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5. "Thrush"?

"Another bird was described by several persons, something like the Thrush, but with yellow bill and legs. Its egg is like the Cuckoo's in shape and color."

Of course, it can only be determined by examples.

Fam. SYLVIIDÆ.

6. **Myiadestes genibarbis**, Sw.—Native name, "Siffleur Montagne; Solitaire".

"The Mountain Whistler frequents the most gloomy and solitary mountain gorges, seeking the most retired situations—not so much from shyness as from some inherent proclivity.

"Found on the borders of open glades in the morning when seeking its favorite food, the berries of a tall shrub. Never found below 1,000 feet altitude. Its mellow notes are first heard from a dark ravine above Shawford Valley as one ascends the mountains. (See Forest and Stream.)

"Length, ♂, 7½ in.; alar extent, 11; wing, 3¾; tail, 3½."

The female differs from the male only in having a wash of brownish-olive across the middle of the back. There is a single specimen of the young; in this each feather of the upper plumage terminates with black, and has an adjoining subterminal round spot of bright rufous; the feathers of the under plumage are more rufous, with the terminal edge less distinctly marked with black; the throat and under tail-coverts are light rufous; the tail as in the adult. This specimen is spotted much in the same manner as the figure of the young of *M. ralloides*, in Exotic Ornithology, by Messrs. Sclater and Salvin, pl. xxxii.

The *M. armillatus* of Bonaparte (Cons. Av. i, p. 335) agrees best with *M. genibarbis*, Sw., as he describes the parotic region to be black, striped with white, a character peculiar to that species. He has Swainson's name as a synonym, considering the two to be identical; he gives for the habitat Central America and the Antilles.

Prof. Baird (Rev. Am. Birds, p. 421) proves that *M. armillatus*, Gosse, from Jamaica, is not *M. armillatus*, Vieill., and names it *M. solitarius*. The true habitat of Vieillot's species is thus left unsettled, and I believe no authentic examples of it are known to exist in any collection. Vieillot, in his original description (Ois. Am. Sept. i, p. 69, pl. 42), gives the Antilles as its habitat; afterwards (Enc. Méth. ii, p. 824) specifies Martinique as a locality.

Mr. Sclater (P. Z. S. 1871, p. 270) considers the last reference as probably applying to *M. genibarbis*. Mr. Sclater also says:—"It is possible that *M. armillatus verus* may be the species from St. Domingo, where there is an unknown representative of this form."

M. genibarbis is noted from St. Lucia by Mr. Sclater in his list of the birds of that island (P. Z. S. 1871, p. 263). The specimens from there he compared with two examples of *M. genibarbis* in the Swainson collection at Cambridge, and found them to agree.

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Swainson erroneously supposed this bird to be a native of Africa; his figure of it (Nat. Lib. vol. xiii), to be correct, should have the chin and an elongated quadrate mark on the lower eyelid pure white.

There are in the collection twelve adult specimens, which are apparently in full plumage, having the pure white chin and rictal stripe separated by a black line, and the white patch on the lower eyelid; in the young example, the white marks are wanting.

Fam. TROGLODYTIDÆ.

7. Thryothorus rufescens, Lawr., Ann. N. Y. Acad. Sci. v. 1, p. 47.

"Wren, ♂, Landat, March 3, 1877.

"Found only in the deep, dark woods, or on their borders. I shot several, but lost them in the rank vegetation. They have a most delicious song, like, I think, our Northern Wood Wren. Will have more extended notes at some future day. I just missed getting its egg. In June I found a nest, and had my boys watching it for eggs, but some one robbed it before me. When I left, I told the people of the valley to procure the eggs and save them for me.

"It (the nest) was merely a few straws in a small hole in a bank, about six inches deep, with a diameter of four inches.

"Length, 4½ in.; alar extent, 6⅝; wing, 2⅛; tail, 1¾.

"Iris bright hazel. Abundant in the deep woods, but hard to find from its terrestrial habits. Native name, 'Osenoli'."

In the first two collections, there being but the type-specimen, I requested Mr. Ober to get more; in the last collection are four others, but all are males. These were procured in September, and are of a darker or brownish-rufous, no doubt owing to the different season.

Fam. SYLVICOLIDÆ.

8. Siurus nævius (Bodd.).

"Wagtail—very scarce.

"Shot while feeding about the pools of the upper waters of the Roseau River, a rocky stream of cascades and water-falls.

"Length, 5¾ in.; alar extent, 9¼; wing, 3⅛, ♀."

9. Dendroeca virens (Gm.).

"Only one seen; very ragged in plumage.

"Length, 5 in.; alar extent, 7⅛; wing, 2¾, ♂."

10. Dendroeca petechia (Linn.).

"Yellow Warbler, 'Titien'. Shawford Valley, March 21.

"Abundant on the plantations of the east coast, overgrown with guava-bushes.

"Length, 5 in.; alar extent, 7¼; wing, 2⅜, ♀."

"A nest with eggs was taken at St. Marie in April."

The nest is well shaped and compactly formed; is composed of fine dried grasses, the outside of coarser materials, strips of bark, and long,

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thin, flag-like leaves, intermixed with a little cotton. It seems large for the bird; it measures in outside diameter 5 inches; height, 2¼; depth of cavity, 1⅝ inches. There are three eggs of a dull white, sparingly speckled with reddish-brown, except on the larger end, where the spots are confluent; two measure in length .75 of an inch and .50 in breadth; the other is .55 in breadth.

11. **Dendroica plumbea**, Lawr., Ann. N. Y. Acad. Sci. v. 1, p. 47.

There are no notes which apply to this species.

12. **Setophaga ruticilla** (Linn.).

"Redstart, 'Chat'. Not common.

"Length, 5 in.; alar extent, 7½; wing, 2½, ♂."

Fam. VIREONIDÆ.

13. **Vireosylvia calidris** var. **dominicana**, Lawr.

"I think this bird is a summer visitor only, as I did not see it before March 19, and then only one. It increased in numbers in April and May; was abundant in the Indian Settlement. I send nest and eggs. Its note makes it conspicuous.

"Length, ♂, 6½ in.; alar extent, 10¼; wing, 3½; tail, 2⅝."

"Local name, 'Chewick'. Iris hazel."

Male.—Upper plumage olive-green, purer and brighter than in *V. calidris;* cap of a clear ash, rather darker than that of var. *barbatula;* a distinct blackish line along the edge of the crown; superciliary stripe ashy-white; cheeks with a tinge of buff; lores and a stripe behind the eye dusky; a blackish moustachial line along each side of the throat; the under plumage is grayish-white, purer on the upper part of the throat and abdomen; sides pale olive-green; under wing-coverts yellow; crissum pure pale yellow; the bill is large and darker than in its allies; the upper mandible is blackish horn-color, the under whitish horn-color.

The female differs in no respects from the male.

The only necessary direct comparison with any of the West Indian or moustached form is with var. *barbadense*, Ridg.; that and the present bird only having a distinct dark line along the edge of the crown. The type of *barbadense* was kindly sent me by Mr. Ridgway: it is smaller than the Dominica species; the plumage above is of a lighter brownish-olive, the cap not so dark, the under parts of a pale yellowish or creamy-white, and the bill of a fleshy-brown color; in general coloring they are quite unlike.

The nest (marked "St. Marie, April 22, '77") is not the beautiful structure described by Dr. Brewer (N. Am. Birds, v. 1, p. 362) belonging to *V. calidris* of Jamaica, and does not appear to have been pensile; it is composed of fine grasses, intermixed on the outside with a coarser kind of a long, thin, ribbon-like form. There are but two eggs—perhaps not the full complement; they are of a dull white, rather closely spotted with

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pale chocolate, confluent at the larger end; they measure in length .80 of an inch by .60 in breadth.

The nest measures in outside diameter 3½ inches; depth of cavity 1½ inches.

Fam. HIRUNDINIDÆ.

14. Progne dominicensis (Gm.).

"'Hirondelle.' Resident.

"The first seen was shot at Mountain Lake, 2,300 feet above sea-level, March 23; later in the season I found a few on the Atlantic side, in June, breeding in the cliffs at Batalie, on the Caribbean shore.

"Length, 7⅞ in.; alar extent, 15; wing, 5¾, ♂."

Fam. CÆREBIDÆ.

15. Certhiola dominicana, Taylor.—Local name, "Sucrier". St. Marie.

"I procured a series of these, that you might be able to determine better the local differences.

"Everywhere abundant in lowland and mountain valleys; breeds in old plantations from March through to the rainy season. I send nests and eggs.

"Length, 4⅝ in.; alar extent, 7¾; wing, 2½.

"I put in a few nests of these birds to illustrate the domed structure—a character that prevails among the smaller birds—grass-birds, Sparrow and Sucrier."

There are two nests, globular in form, one containing three eggs, obtained at St. Marie, April 20, 1877; the other with four eggs, in Shawford Valley, in April. For the size of the bird, the nest seems a bulky structure, but is elaborately made; the inside is of fine grasses; the outside of fine wiry stems of some plant, and the thin flag-like leaves spoken of in describing the nest of *Dendræca petechia;* it has an outside diameter of 5 inches, the depth of the cavity 3 inches, across the opening 1¾ inches. The entrance is on the side. The eggs are dull white, some closely spotted with pale reddish-brown; others less so; some with the spots confluent at the larger end; others having them distinct. They measure .68 of an inch in length by .53 in breadth.

Fam. TANAGRIDÆ.

16. Euphonia flavifrons (Sparm.).

"'L'oiseau de St. Pierre.' Rare.

"Feeds among the tops of trees in the high woods; said to occur, also, on the coast; stomach full of small green seeds.

"Length, 4¾ in.; alar extent, 8; wing, 2⅝; tail, 1⅝, ♀."

There is in the collection but one specimen, a female, which I suppose to be this species. I wrote Mr. Ober to endeavor to get others, but he was unable to do so. I have a male specimen from Porto Rico of *E.*

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sclateri, presented by Dr. Gundlach—this is much smaller than the above, measuring in length 4¼ in.; wing, $2\frac{5}{16}$; tail, $1\frac{7}{16}$.

17. **Saltator guadeloupensis**, Lafr.—Local name, "Grosbec".

"Found among the bushes and low trees fringing the cleared valleys and open plateaus. Its clear note makes it a marked bird in the breeding season. Found eggs in May. Inhabitant of both coasts. Not abundant.

"Length, 8½ in.; alar extent, 12¼; wing, 4; tail, 3⅝, ♀.

"Length, 8½ in.; alar extent, 12½; wing, 4; tail, 3⅝, ♂.

"Nest obtained at St. Marie, Indian country, May 1, 1877; lays from two to three eggs at a time."

The sexes do not differ in plumage. The nest is made of the stems of coarse grasses, and though appearing to be loosely put together, yet is quite compact; there are a few finer stems at the bottom of the cavity. The outer diameter is 5½ inches, height 3 inches, depth of cavity 1¾ inches. The eggs are light greenish-blue, with a few irregular black markings on the larger end; the length is 1.06 of an inch, the width .80.

Fam. FRINGILLIDÆ.

18. **Loxigilla noctis** (Linn.).—Local name, Moisson; Père Noir; Sparrow.

"The male is black, the female gray, I have no doubt, as they are always seen together. Very common, especially on old plantations; make their nests in low trees and stout shrubs. The nest sent, with three eggs, was obtained in Shawford Valley, March 21, 1877.

"Length, 5½ in.; alar extent, 9; wing, 3; tail, 2⅜, ♂.

"Length, 5¼ in.; alar extent, 8½; wing, 2⅞; tail, 2⅛, ♀."

The nest under examination is placed in the upright trifurcated branch of a prickly shrub or tree, and is thus supported behind and on each side; it is a large and loosely formed structure, composed of fine stems of plants, dried leaves, and small, dried plants; it is covered over or domed, and has a large opening in front, the lower part, which is the nest proper, is more compact, and is lined at the bottom with fine, soft grasses or stems of plants; the height of the nest outside is 8 inches, the breadth 5; the opening in front has a diameter of 3 inches; depth of cavity, 2 inches. The complement of eggs is three. Those sent differ much in size and appearance. One is nearly white, marked with minute pale spots of reddish-brown, quite evenly distributed; this measures .80 by .62 of an inch. Another, of about the same size, is more conspicuously spotted; at the larger end densely so; size, .78 by .57. The last is much smaller, the spots larger and darker; it is closely spotted all over, the spots not confluent at the larger end; it measures .72 by .50.

Mr. Sclater speaks of the single specimen from St. Lucia (P. Z. S. 1871, p. 271), and referred to this species as differing from a Martinique

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skin in having "no rufous at all on the crissum, and the superciliary mark shorter".

Five males in the collection from Dominica have the under tail-coverts rufous, of the same shade as that of the throat; the rufous line running from the bill is darker, and extends over the eye as far as upon a line with its centre. Probably the Dominica and Martinique birds are alike; but if other examples from St. Lucia prove to be without rufous crissums, it would seem to be a well marked variety.

The female from Dominica is, above, a brownish-olive, having the face, sides of the head, and upper tail-coverts tinged with rufous; the wing-coverts and tertials are edged with bright rufous; the under plumage is of a dark ashy-olive; the under tail-coverts are pale rufous.

Specimens of a *Loxigilla* collected in Guiana by Mr. A. H. Alexander (taxidermist), though similar in color and markings to examples of *L. noctis* from Dominica, are so much less in all their measurements that I think, at least, it may be considered a variety. The bill of the Guiana bird is much smaller, the under mandible of a brownish horn-color, being black in the West Indian bird; the under tail-coverts are of a paler rufous; the rufous of the throat more restricted, and the superciliary line extending beyond the eye.

The measurements of the two are as follows:—

Dominica bird, ♂, length, 5½ in.; wing, 3; tail, 2⅜; tarsus, ¾.

Guiana bird, ♂, length, 4½ in.; wing, 2⅝; tail, 2; tarsus, ⅝.

Viewed together, the skin of the West Indian bird appears to be nearly twice the bulk of the other.

I propose to distinguish the South American form by the name of *Loxigilla noctis* var. *propinqua*.

Mr. Alexander obtained quite a number of this small species in Guiana, but he had disposed of most of them before they came under my notice. Three males examined were alike in size and coloring. I was unable to find a female among the birds collected by him: this is easily accounted for; his object in making collections being to secure the more showy and saleable males.

Mr. Alexander informed me that they were not uncommon along the Essequibo River, and that he saw them also at Berbice.

The only citation of Guiana as a locality for *L. noctis* that I have noticed is by Bonaparte (Cons. Av. i, p. 493), viz, "Surinam"; he also gives Martinique.

19. Phonipara bicolor (Linn.).

"Si Si Yerbe; Grass-bird.

"Abundant everywhere; breeds in great numbers in Shawford Valley, three miles from the coast; nests in lime-trees.

"One with three eggs taken April, 1877; another with four eggs."

"Length, ♂, 4⅜ in.; alar extent, 6⅞; wing, 2¼.

"Length, ♀, 4¼ in.; alar extent, 6½; wing, 2⅛."

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The nest is globular in shape, and is composed of fine roots and stems of plants, intermixed with thin, flag-like leaves; it is 6½ inches high and 5½ inches broad; the opening is 2 inches across; depth of the cavity, 1½ inches. The eggs are quite uniform in appearance; they are white, with a scarcely perceptible greenish tinge, sparingly speckled with reddish-brown, except on the larger end, where the examples vary in having the spots more or less confluent. They vary in size from .66 to .57 of an inch in length, and in breadth from .54 to .50.

Fam. TYRANNIDÆ.

20. Elainea martinica (Linn.).—Local name, "Quick".

"Rather abundant in the mountain valleys, especially in the lateral ravines bordering the glades of open pastures. In habits and cry resembling our Phœbe-bird.

"Length, ♂, 6¾ in.; alar extent, 10½; wing, 3½.

"Length, ♀, 6 in.; alar extent, 10; wing, 3⅜."

Of this species, Mr. Ober sent nine examples. Mr. Sclater (P. Z. S. 1871, p. 271) considers *E. riisii* from St. Thomas "undistinguishable" from *E. martinica*. I have but one specimen of *E. riisii*, which differs only from the Dominica bird in being light brownish-olive above; the upper plumage of *E. martinica* is dark olive; the difference may be seasonal. Mr. Sclater also raises the question whether *E. pagana* "is really separable"; in five specimens, so-called, from Brazil, Guiana, and New Granada, the most marked difference from the West Indian bird is that the breast and abdomen are of a decided pale yellow. In *E. martinica*, the throat and breast are of a clear bluish-gray, the abdomen with just a tinge of yellow.

Mr. Sclater (P. Z. S. 1870, p. 834) thinks that his *E. subpagana* will have to be reunited to *E. pagana*. I have one example of this form, from the City of Mexico, which is of a bright yellowish-olive above, and the abdomen of a fine clear light yellow. These differences may be due to geographical position.

21. Myiarchus oberi, Lawr., Ann. N. Y. Acad. of Sci. v. 1, p. 48.—Local name, "Soleil coucher".

"It is so called because it utters its peculiar cry just at sunset; the hunters say when Soleil Coucher cries, it is time to make *ajoussa*, or camp. Obtained at Landat in March; not common.

"Length, ♂, 9 in.; alar extent, 12½; wing, 4.

"Length, ♀, 8¼ in.; alar extent, 12½; wing, 4."

22. Blacicus brunneicapillus, Lawr, Ann. N. Y. Acad. Sci. v. 1, p. 161.—Local name, "Goubemouche".

"Everywhere abundant in the ravines and dark valleys of the mountains.

"Length, ♂, 5¾ in.; alar extent, 8½; wing, 2⅞; tail, 2¾."

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23. Tyrannus rostratus, Scl.

"Pipere; Loggerhead."

"More an inhabitant of the lowlands than the mountains; found it abundant in St. Marie, Atlantic coast.

"Found a nest with two eggs, April 20, 1877.

"Length, ♂, 9½ in.; alar extent, 15; wing, 4½.

"Length, ♀, 9¾ in.; alar extent, 15½; wing, 4¾."

The nest is rather loosely made, of small harsh-feeling roots and stems of plants, with no soft lining for the eggs; it is 4½ inches wide, with a height of 2 inches, the cavity but half an inch deep. The two eggs are alike in size, but vary in shade of color: one is of a light reddish salmon color, with large conspicuous spots of a deep rusty-red, mostly around the larger end; the other is white, with a slight tinge of color, the spots smaller and less conspicuous. They measure 1.06 by .77.

Fam. TROCHILIDÆ.

24. Eulampis jugularis (Linn.).

"Large Crimson-throat Hummingbird."

"This species called 'Colibri' in *patois* French.

"This species is almost exclusively a frequenter of the high valleys of the mountains, though found lower down also. It delights in the plantain and provision grounds of the mountain sides, and there may be seen in early morning, glancing among the leaves, hovering over the flower clusters. In the open glades, also, it was abundant about the wild honeysuckle and flowering shrubs. It was easily approached, and many were caught for me by the little mountain boys, with native bird-lime, the juice (inspissated) of the bread-fruit tree.

"I did not find it anywhere common on the east, or Atlantic side of the island. Took a nest and two eggs in June. It breeds later in the season than the smallest species (the Crested). Nest built in bread-fruit tree. Have nests of the three species.

"Length, ♂, 5 in.; alar extent, 7½; wing, 3⅜.

"Length, ♀, 5 in.; alar extent, 7⅛; wing, 3."

This would seem to be a very abundant species, as Mr. Ober procured about fifty specimens. Most of these bear evidence of having been captured with bird-lime. The female differs only in the color of the throat being somewhat duller.

Mr. Ober speaks of having obtained "nests of the three species"; but none have been received.

25. Eulampis holosericeus (Linn.).

"Green or Blue-throated Hummingbird."

"This is not so abundant as the others. It prefers shade and seclusion. I noticed the curious habit first in this species, that it possesses in common with the larger, of flitting about in the dark forest, where a

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gleam of light would penetrate. It would dart and double with rapidity, occasionally fluttering on suspended wing, like a Hawk, then dart off to a near twig, whence, after resting a while, it would renew its forage upon the diminutive insects sporting in the ray of dusky light.

"Procured a nest and two eggs, in June, from a 'cactus' tree."

"Length, ♂, 4½ in.; alar extent, 6; wing, 2½."

26. Thalurania wagleri (Less.).

"White-throat Hummer." September, 1877.

"This bird I found tolerably abundant, principally in the shady mountain paths of the 'high woods'. I saw but one before (earlier in the year) in March, while on my way to the Boiling Lake. It may be the young of No. 368 or 369, but of this you can judge, as I send specimens of each kind. Inhabits the mountains.

"Length, ♀, 4¼ in.; alar extent, 6; wing, 2⅜."

Mr. Ober's note given above refers to the female of this species, of which two examples were sent in his last collection; also one male, No. 369; on the label of this specimen he wrote, "Purple-throat Hummer, ♂ ♀. Length, 4½ in.; alar extent, 6; wing, 2½." (No. 368 is *Eulampis holosericeus*.) This is the first allusion he has made to its being a distinct species, which is difficult to account for, as the male is also very different in appearance from the three other species found abundantly in the island. In his first collection, seven males of *T. wagleri* were sent, but there is no note or any comment to lead to the supposition that he considered it a fourth species—the three regular forms being the only ones spoken of.

The female of this species appears to have been more rarely obtained than the male.

It has the crown and upper tail-coverts bluish-green, the upper plumage and wing-coverts dark green tinged with golden; the middle tail-feathers are golden bronze, ending with greenish-blue; the other tail-feathers are greenish-blue, with their bases golden bronze, and ending with grayish-white; the lores, a line under the eye, and the ear-coverts are black; the under plumage is ashy-white; the bill is entirely black.

The procuration of the female establishes this species as being resident in Dominica.

27. Orthorhynchus exilis (Gm.).

"Small Crested Hummer."

"This species is called by the natives, 'Fou, Fou,' or 'crazy, crazy,' from its eccentric motions in the air.

"It is not uncommon along the coast and in the lower valleys. Almost the only species on the Atlantic side in April and May. Very abundant everywhere. Took first nest, March 20, in Shawford Valley; found others as late as June 20, at Batalie, on sea-coast.

"In order of numerical abundance this species can be first, the Crimson-throat second, the Blue or Violet-breast third.

"Length, 3½ in.; alar extent, 4¾; wing, 2, ♂."

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Fam. CYPSELIDÆ.

28. Chætura poliura (Temm.).

"Swift.

"This bird only appears after a rain, then in great numbers, darting swiftly about, disappearing as soon as it has ceased. In March saw but three at the Mountain Lake, 2,300 feet. In June they had descended to the valleys, and were even sporting about the seashore.

"They live and breed among the cliffs, high up the mountains and near the waterfalls of the Roseau Valley. Abundant also at Batalie, lower down the coast.

"Length, ♂, 4⅝ in.; alar extent, 10½; wing, 3⅞."

I have never seen an example of *C. poliura*, but as the bird under investigation agrees in plumage quite well with the description of that species given by Mr. Sclater (P. Z. S. 1865, p. 611), I have called it so provisionally; it differs, however, in dimensions, the wing especially being shorter.

29. "Swift."

"A species of Swift, intermediate in size between the small Swift and the large Martin."

This species has not yet been obtained.

Fam. ALCEDINIDÆ.

30. Ceryle alcyon (Linn.).

"Kingfisher."

"Seen in April on the windward side of Dominica, and again in September on the leeward, or Caribbean side. In September it appears more plentiful. Undoubtedly a resident."

No specimen sent, but is this species without much doubt.

Fam. CUCULIDÆ.

31. Coccyzus minor (Gm.).

"Cuckoo; Manioc."

"Not very plentiful; unsuspicious, stupid; its cry similar to that of Yellow-billed Cuckoo, but more prolonged, sharper, and harsher.

"Nesting in May; inhabits the low shrubs and trees of old clearings.

"Length, ♂, 13 in.; alar extent, 16½; wing, 5½.

"Length, ♀, 13½ in.; alar extent, 17; wing, 5½."

Fam. PSITTACIDÆ.

32. Chrysotis augusta (Vig.).

"'Cicero.'

"Except in the rainy season, this bird can only be found in the high mountains, where grow the mountain palm, *gomier*, *bois diable*, and other

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trees of mountain growth, upon the seeds of which it feeds. It is there abundant, yet shy and difficult to approach. Its cry is harsh, resembling the call of a Wild Turkey. Morning and evening they call one to another for perhaps an hour; during the rest of the day they remain silent, except for an occasional cry. When a gun is fired, they all cry out, and then keep perfect silence. They do not seem to associate in flocks at this season, like the Parrot, but are found more often in pairs. They breed in the hollow tops of high trees, and the young are rarely taken. When caught young, they readily learn to talk. The only manner in which one is secured alive is by being wounded.

"It descends to the valleys in the rainy season to some extent, but prefers the mountains. At that time they are very fat, excellent eating, and much hunted.

"I made an excursion into their mountain fastnesses, camping on their feeding grounds, but only secured three (though assisted by the Carib hunters), the country was so wild and the birds so shy.

"Length, ♂, 21 in.; alar extent, 35; wing, 11.

"Length, ♀, 22 in.; alar extent, 36; wing, 12."

As specimens of the Imperial Parrot are exceedingly rare in collections, and a description of it not readily available, I thought that one taken from the examples before me might prove useful.

The male has on the front adjoining the bill a narrow line of a dark warm brown color; the feathers of the crown and occiput are of a rather dull bluish-green, with lighter terminations; the feathers of the hind neck, and extending around in front, are bronzy-green, with a broad subterminal band of dark bluish-purple, and ending with black; the feathers of the back, wing-coverts, flanks, and upper tail-coverts are of a bright, rather dark green, conspicuously edged with lighter or verditer-green; these terminal edgings are crossed with waving dark marks like water-lines; the tail-feathers are reddish-brown, having their bases green for a short space, the two middle feathers show more green; the edge of the wing is scarlet (not the flexure); the primaries have their outer webs bright dark green for two-thirds their length, the terminal third of a brownish-purple; the first quill is entirely, and the inner webs of the others are of a dark purple; all but the first primary have their outer webs incised; the secondaries have their outer webs green; on the outer two a speculum of scarlet; the inner webs are dark purple; on the chin and sides of the throat adjoining, the feathers are dark brown, with coppery terminations; the ear-coverts are brown, ending with light bluish; the feathers of the lower part of the throat, the breast, and abdomen are bronzy dark olive, broadly marked subterminally with an opalescent band of violet-purple and light blue, changeable in different lights, their terminal margins are black; the upper mandible is dark horn-color, with a whitish mark on its side at the base; the under mandible is lighter; the feet blackish-brown.

The female specimen has the colors a little duller, and the speculum less bright, but it may be possibly younger.

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33. "Parrot."

"Not abundant.

"This bird, about the size of our Northern Carolina Parrot, but more robust, is very shy, keeping mainly to the higher mountains; sometimes descending to the inner valleys, to feed upon the wild guavas.

"It is sometimes captured by being wing-broken, and takes kindly to confinement, but unlike its larger brother, the Cicero, does not learn to talk. It congregates in small flocks. It is oftener shot in the months between September and February. A very beneficent law of Dominica prohibits the shooting of Parrots, Ciceros, Ramiers, &c., in any other months, thus ensuring protection during the breeding season."

This species was not obtained by Mr. Ober.

Fam. STRIGIDÆ.

34. **Strix flammea var. nigrescens**, Lawr.

"Owl. 'Shawah.'

"Very rare; its cry even is seldom heard. It haunts principally the mountains and higher valleys; builds its nest in a hollow tree, or in the hollow of a large limb, and lays eggs elliptical in shape, white and granular. In this case they were three in number, and from the appearance of the ovules, were the full complement. They were newly laid, September 19."

I find this to be a very dark variety of *Strix flammea*. At my request, Mr. Ridgway sent me a specimen of the dark-plumaged form (var. *guatemalæ*, from Costa Rica), spoken of in N. A. Birds, v. 2, p. 14. On comparison, the difference is very marked: the example from Costa Rica is above brown, intermixed with rufous, and closely freckled with fine whitish vermiculations; it is also marked, not closely, with whitish ovate spots surrounded with black; the color below is dark reddish-ochraceous, with black sagittate spots. The sex not given. It measures, length, 14½ in.; wing, 13; tail, 6; tarsus, 2¾.

The male from Dominica has the upper plumage of a fine blackish-brown, rather sparsely marked with small white spots; the tail is crossed with alternate bands of brown and light dull ochraceous freckled with brown; the wings are the color of the back, somewhat intermixed with rufous; the under plumage is light reddish-ochraceous, marked with small round black spots (the color is lighter than the under plumage of the Costa Rica specimen); the ends of the ruff-feathers are dark reddish-brown; feathers around the eye, black; the face is of a light reddish fawn color. "Bill white; iris deep chocolate, half an inch in diameter."

Length (fresh), 13 in.; wing, 10; tail, 4½; tarsus, 2.

The female is of the same dark color above, with the white spots so minute as to be scarcely perceptible; the tail is darker; the under plumage of a darker reddish-ochraceous than in the male (not so dark

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as that of the Costa Rica specimen), a few roundish black spots on the breast; on the abdomen the markings are in clusters, and irregular in form.

Length (skin), 13 in.; wing, 9½; tail, 4⅞; tarsus, 2⅛.

Besides its much darker upper plumage, the Dominican form is of much smaller dimensions.

The color of the eggs is dead white; they measure in length 1.60 by 1.22 in breadth.

Fam. FALCONIDÆ.

35. Pandion haliætus (Linn.).

"Fish-hawk."

"Seen circling over the sea in September."

36. Buteo pennsylvanicus (Wils.).

"'Mal fini.' St. Marie, Indian country.

"This bird courses above the valley, uttering its cry of 'Mal fini, fini'. It is not abundant; eats lizards as well as small birds. The largest of the Hawks here resident. Iris amber.

"Length, ♂, 15 in.; alar extent, 32; wing, 10½.

"Length, ♀, 15 in.; alar extent, 32; wing, 10."

37. Tinnunculus sparverius var. antillarum (Gm.).

"'Glee glee.' Nowhere abundant.

"Length, ♂, 10½ in.; alar extent, 20; wing, 6¾."

The two specimens sent were submitted to Mr. Ridgway for determination; he wrote me as follows:—"The Dominica *Tinnunculus* is identical with that from St. Thomas, St. Bartholomew, and Porto Rico. It is what I have called '*sparverius* var. *dominicensis*', but I find upon further investigation that it should bear the name of *antillarum*, Gm.—*dominicensis* being, as I now conclude, the bird which I have called *leucophrys*." Mr. Ridgway also wrote:—"You may mention that I have a male *T. sparveroides*, in the plumbeous plumage, from South Florida."

Fam. FREGATIDÆ.

38. Fregata aquila (Linn.).

"Man o' War Hawk; Frigate Pelican."

"Often seen flying at great height; said to breed on an inaccessible cliff on the southeastern side of the island."

Fam. PHÆTHONIDÆ.

39. Phæthon flavirostris, Brandt.

"Tropic Bird. Abundant.

"Breeds in the cliffs near the Lime Plantation of Batalie, the property of Dr. Imray. They also breed in the cliffs of Mount David, near

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Roseau. They appear from out their holes early in the morning, go out to sea to fish and return at 9 or 10; coming out again in the afternoon. A road winds at the base of the cliff, and thus they can be closely observed. They are said to reside here the year through, and commence incubating in April.

"Length, ♂, 23 in.; alar extent, 36; wing, 11½.

"Length, ♀, 27 in.; alar extent, 36; wing, 11½."

Fam. PELECANIDÆ.

40. Pelecanus fuscus (Linn.).

"Brown Pelican."

"One or two seen; does not breed here, but probably on the nearest sandy island."

Fam. ARDEIDÆ.

41. Ardea candidissima (Gm.).

"'Gaulin blanc.' Not common.

"In such rivers as that at Hatton Garden, which runs a long distance through a tolerably level valley, with broad shallows, banks well lined with bushes, with deep holes well stocked with fish, this bird is often found. Iris pale yellow.

"Length, ♂, 21½ in.; alar extent, 35; wing, 10½ in."

42. Ardea cærulea, Linn.

"'Crabier noir.'

"Shot in a stream far up the mountains. Iris straw-color.

"Length, ♀, 21½ in.; alar extent, 37; wing, 10½."

43. Butorides virescens (Linn.).

"Green Heron. Common.

"Breeding season commenced in April; found eggs in June. Iris yellow.

"Length, ♀, 19½ in.; alar extent, 26; wing, 7¼."

Fam. COLUMBIDÆ.

44. Columba corensis, Gm.

"'Ramier.'

"Abundant in the high woods, never touches earth; makes its nest in the high gomier trees in May. Shot in numbers in the rainy season, then very fat and most delicious eating. Iris orange, shot with gold, with an inner circle around of darker color.

"Length, ♂, 16 in.; alar extent, 28; wing, 9."

45. Zenaida martinicana, Bp.

"'Tourterelle.'

"Breeds on rocks and cliffs along the coast (Caribbean), very plenti-

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ful. In the mountains not numerous; abundant in Indian country, coming about the huts even, not being troubled there. Found eggs in June at Batalie.

"Length, ♂, 12½ in.; alar extent, 19; wing, 7."

46. Chamæpelia passerina (Linn.).

"Ground Dove. 'Bagas.'

"Not numerous on the hills; on Grand Savannah, near Batalie, Caribbean coast, abundant. Found eggs in June; the nest, a frail platform of grass stalks and sticks, placed on an old stump.

"Length, ♀, 6¾ in.; alar extent, 10¼; wing, 3½."

47. Geotrygon montana (Linn.).

"'Perdix rouge', ♂; 'Perdix noir', ♀.

"Not uncommon in the high woods; called Perdix or Partridge; robust; strong in short flight, and frequenting the ground; it more resembles that bird than a Dove. Iris yellow.

"Length, ♂, 10½ in.; alar extent, 19½; wing, 6½.

"Length, ♀, 10¼ in.; alar extent, 18; wing, 6."

The two eggs sent are of a rather light salmon color, and immaculate; they measure 1.19 by .89.

Fam. CHARADRIIDÆ.

48. Charadrius virginicus, Borkh.

"Golden Plover."

"Arrives in flocks, frequenting the 'Grand Savannah', staying but a short time."

49. Strepsilas interpres (Linn.).

"Only one seen, at Scott's Head. The flocks of migratory Plover and Curlews visit Dominica but little, preferring lower islands, like Antigua and Barbuda to the rocky islands, where their favorite food is necessarily scarce.

"Length, 9 in.; alar extent, 18½; wing, 6."

Fam. SCOLOPACIDÆ.

50. "Sandpiper."

Species undetermined; seen, but not obtained.

51. Tringoides macularius (Linn.).

"A resident species. In the hurricane months, the island is visited by numberless flocks of Plover. No other Sandpiper or Plover (I think) resides here.

"Length, ♀, 7¾ in.; alar extent, 12¼; wing, 3¾."

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Fam. LARIDÆ.

52. "Tern."

"Not procured, but I think is *Sterna stolida*."

53. **Sterna antillarum** (Less.).

"Tern.

"Very few seen; principally about Scott's Head, the southernmost point of the island.

"Length, ♂, 8½ in.; alar extent, 18½; wing, 6½."

54. **Sterna fuliginosa** (Gm.).

"'Twa oo.'

"When I reached Dominica, September 15, large flocks of this species were skimming the water, apparently feeding upon the fish. There were hundreds. Wishing to get into the mountains at once, I neglected to get this bird, thinking it would be on the coast upon my return. In a week, however, the squally weather which had brought them in had passed, and they also had disappeared. I was able only to procure this mutilated specimen, which I send with regret."

55. **Sterna anæstheta**, Scop.

"Tern."

"St. Marie, Atlantic coast, April 20. This bird made its first appearance a week ago, coming from the open ocean, to breed upon a rock off this stormy shore. My Indian boys procured twenty eggs from the rock. The birds leave the island so soon as their young are fledged.

"Length, ♂, 14½ in.; alar extent, 29; wing, 10⅛.

"Length, ♀, 15½ in.; alar extent, 30; wing, 10⅜."

Fam. PROCELLARIDÆ.

56. "'Diablotin.'"

"Twenty years ago it was abundant. Said to have come in from the sea in October and November, and to burrow in the tops of the highest mountains for a nest. In those months it incubated. The wildest stories are told about it, and but for the evidence of such a man as Dr. Imray, I should treat it as a myth. Doubtless as you write, it may be identical with the Jamaica Petrel."

On first receiving the account of this bird from Mr. Ober, I wrote to Professor Baird, suggesting that it might be *Puffinus obscurus*, which species was found breeding in the Bahamas by Dr. Bryant. Professor Baird replied that he thought it was more likely to be *Prion Caribbæa*, discovered in the Blue Mountains of Jamaica a few years since.

It is quite possible it may be an undescribed species, and its acquisition is most desirable.

It goes and comes, doubtless, mostly if not altogether at night. If the burrows made by it could be found when the birds are incubating, probably they could be unearthed in the daytime, and thus be secured.

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Its movements being like those attributed to evil spirits, probably suggested the name by which it is known.

Dr. Bryant (Proc. Boston Soc. of N. H. v. 7, p. 132) gives the following account of *Puffinus obscurus*:—"The nest is always placed in a hole or under a projecting portion of the rock, seldom more than a foot from the surface, and never, as far as my experience goes, out of reach of the hand. On being caught they make no noise, and do not resist at all. Why these birds and the Stormy Petrels never enter or leave their holes in the daytime, is one of the mysteries of nature; both of them feeding and flying all day, yet never seen in the vicinity of their breeding places before dark."

NOTES ON A COLLECTION OF FISHES FROM CLACKAMAS RIVER, OREGON.

By DAVID S. JORDAN, M. D.

The United States National Museum has lately received from Mr. Livingston Stone a small collection of fishes obtained by him from the Clackamas River, a tributary of the Columbia in Oregon. The collection comprises only six species, but each species (excepting *Salmo tsuppitch*) is represented by several specimens, all in excellent condition; and it so happens that each one of these is a species of special scientific interest, and one concerning which our knowledge has for one reason or another been incomplete. Four of these species were first described by Richardson (Fauna Boreali-Americana, 1836), viz, *Oncorhynchus quinnat*, *Salmo tsuppitch*, *Salmo clarki*, and *Gila oregonensis;* another, *Acrochilus alutaceus*, was first made known by Professor Agassiz (Am. Journ. Sci. and Arts, 1855); and the last, *Salvelinus spectabilis*, by Dr. Girard in 1856.

1. ONCORHYNCHUS QUINNAT (Richardson) Günther.

California Salmon. Columbia Salmon. Quinnat Salmon.

1836—*Salmo quinnat* RICHARDSON, Fauna Bor.-Am. iii, p. 219, (described from notes by Dr. Gairdner).

Salmo quinnat DEKAY, Fauna New York, Fishes, p. 242, 1842, (copied).

Salmo quinnat STORER, Synopsis Fish. N. A. p. 196, 1846, (copied).

Salmo quinnat HERBERT, Frank Forrester's Fish and Fishing, Supplement, p. 31, 1850.

Salmo quinnat GIRARD, Proc. Ac. Nat. Sc. Phila. viii, p. 217, 1856.

Salmo quinnat GIRARD, Pac. R. R. Rep. Fishes, p. 306, pl. 67, 1858.

Salmo quinnat SUCKLEY, Nat. Hist. Wash. Terr. p. 321, 1860.

Oncorhynchus quinnat GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 158, 1866, (compiled).

Salmo quinnat SUCKLEY, Monograph Genus Salmo, Rept. U. S. Fish. Comm. p. 105, 1874.

Salmo quinnat NELSON, Bull. Ills. Mus. Nat. Hist. i, p. 43, 1876, (Illinois River).

Salmo quinnat HALLOCK, Sportsman's Gazetteer, p. 359, 1877.

Oncorhynchus quinnat JORDAN, Man. Vert. ed. 2d, p. 357, 1878.

Oncorhynchus quinnat JORDAN, Catalogue Fresh-water Fishes N. A. p. 431, 1878.

Salmo quinnat, U. S. Fish Comm. Repts., and of writers on Salmon and fish culture generally.

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1856—*Fario argyreus* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 218.
Fario argyreus GIRARD, Pac. R. R. Surv. Rep. Fishes, p. 312, pl. 70, 1858.
Salmo argyreus SUCKLEY, Nat. Hist. Wash. Terr. p. 326, 1860.
Salmo argyreus SUCKLEY, Monograph Salmo, p. 110, 1874.
1861—*Salmo warreni* SUCKLEY, Ann. Lyc. Nat. Hist. N. Y. vii, p. 308.
Salmo warreni SUCKLEY, Monograph Salmo, p. 147, 1874.
Salmo warreni JORDAN & COPELAND, Check List, p. 144, 1876.

This species, the most abundant and most valuable of the *Salmonidæ* of the Pacific coast, is represented in the present collection by numerous partly grown specimens, some black-spotted and some nearly plain silvery. The only question which now arises in the synonymy of this species is as to its distinctness from its congener *O. nerka* (Walbaum), (*O. lycaodon* Pallas). The slender, more fusiform, and less compressed form of the latter species, as well as its fewer branchiostegals and less forked tail, seem to indicate specific difference. The types of *Fario argyreus* Girard, I have examined. They are two in number, each about 8 inches long, and are evidently young *quinnats*. The original types of *Salmo warreni* are apparently lost. There is, however, a bottle of small silvery fishes, young individuals of *quinnat*, in the National Museum, labelled by Dr. Suckley "*Salmo warreni?*" There can be little doubt that the original types of *Salmo warreni* were similar specimens of a young *Oncorhynchus*, most likely the young of *O. quinnat*.

There can be no possible doubt of the entire generic distinctness of the genus *Oncorhynchus* from *Salmo*, although the characters assigned to *Oncorhynchus* by Dr. Suckley have no such value. The great development of the anal fin and the peculiar form and dentition of the vomer are of much more importance than the hooked jaws of the male, although neither character was noticed by Dr. Suckley. Indeed, this author includes most of the *Oncorhynchi*, under one name or another, in his subgenus *Salmo*. Thus the species termed by him *quinnat*, *confluentus* (= *keta*), *argyreus* (= *quinnat*), *paucidens* (= *nerka*), *truncatus* (= *nerka*), *richardi* (= *nerka*), *kennerlyi*, and *warreni* (= *quinnat*), are all hook-jawed species, with a long anal fin and an increased number of branchiostegals, yet they are all referred by Dr. Suckley to his subgenus *Salmo* proper.

An examination of the specimens of *Oncorhynchus* in the National Museum, including all of Dr. Suckley's types excepting *richardi* and *warreni*, has convinced Dr. Gill and myself that they all belong to five species, *O. gorbuscha*, *O. keta*, *O. nerka*, *O. quinnat*, and *O. kennerlyi*. These are divisible into two very strongly marked subgenera, or perhaps even distinct genera,—*Oncorhynchus*, including the first four species named, and *Hypsifario*, Gill, including only *kennerlyi*. *O. kennerlyi* is very much smaller than the other species, and is much more compressed and of a different form. Its form seems to me, however, rather an exaggeration of that of *O. quinnat* than a distinct type, and the resemblance is almost as great between *quinnat* and *kennerlyi* as between *quinnat* and *gorbuscha*.

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The species of *Oncorhynchus* at present admitted by Dr. Gill and myself may be briefly compared as follows:—

a. Body more elongate, heavier forward and less compressed than in the next; jaws in the adult males very unequal; the lower jaw prolonged and hooked upwards; the upper jaw still more elongate and curled over the tip of the lower, the profile of the forehead being concave when viewed from the side; teeth of the premaxillaries and of the tip of the lower jaw greatly enlarged and hooked .....(Subgenus *Oncorhynchus*.)

b. Scales very small, in more than 200 transverse rows; smaller on caudal peduncle than on flanks; form much distorted in the adult males, the fleshy hump at the shoulders being greatly developed, and the caudal peduncle slender and rather elongate; the jaws greatly prolonged and curved; size small. (Pacific coast and streams, Washington to Kamtschatka.) .....GORBUSCHA.*

bb. Scales medium, in about 170 (155 to 180) transverse rows; form distorted, but less so than in the preceding, the fleshy hump considerably developed in the males, and the jaws greatly elongated and hooked; branchiostegals about 16. (Pacific coast and streams, Oregon to Kamtschatka.) .....KETA.†

bbb. Scales large for the genus, in about 133 transverse rows.

c. Form elongate, not greatly compressed, the greatest depth in advance of the middle of the body; the males with the caudal peduncle rather slender, and with a well-marked fleshy hump, and with the jaws much elongated and distorted; caudal fin feebly forked; branchiostegals about 13. (Pacific coast and streams, California to Kamtschatka.) .....NERKA.‡

cc. Body elongate, compressed, the greatest depth (in female and immature specimens at least) being just under the dorsal fin; depth of body one-fourth of length, or a little more; head moderate, rather bluntly pointed; less distorted in male specimens than in the preceding species; maxillary shortish, curved, reaching somewhat beyond eye; caudal fin more or less forked; branchiostegals 15 or 16. (Coast and streams, California to Alaska.).....QUINNAT.

aa. Body oblong, very strongly compressed, the dorsal region much elevated; a nearly even slope from the snout to the base of the dorsal fin; dorsal fin unusually far back, the first ray being behind the middle of the body; head long, deep, compressed, but still wide; mouth extremely large and very oblique; the jaws about equal in the females; in the males, the lower jaw protruding beyond the upper, which is curled up like the snout of a snarling dog, showing the enlarged canines, the premaxillaries never hooking over the lower jaw, as is the case with *Oncorhynchus* proper; dentition as in typical *Oncorhynchus*.

(Subgenus *Hypsifario* Gill.)

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*ONCORHYNCHUS GORBUSCHA (Walb.) Gill & Jordan.—*Gorbuscha*, Pennant, Arctic Zoology.—*Salmo gorbuscha*, Walbaum, Artedi Gen. 1792.—*Salmo gibber*, Bloch, Schneider, Ichthyologia, 1801.—*Salmo proteus*, Pallas, Zool. Rosso-Asiatica, 1811.—*Salmo gibber*, Suckley, 1861.—*Oncorhynchus gorbuscha*, Jordan, Man. Vert. ed. 2d, 1878.

†ONCORHYNCHUS KETA (Walbaum) G. & J.—*Keta* vel *kayko*, Pennant, Arctic Zoology.—*Salmo keta* vel *kayko*, Walbaum, 1792.—*Salmo keta* vel *kayko*, Bloch, Schneider, 1801.—*Salmo lagocephalus*, Pallas, 1811.—*Salmo scouleri*, Richardson, 1836.—*Salmo confluentus*, 1861.—*Oncorhynchus keta*, Jordan, Man. Vert. ed. 2d, 1878.

‡ONCORHYNCHUS NERKA (Walb.) Gill & Jor.—*Nærka*, Pennant, Arctic Zoology.—*Salmo nerka*, Walbaum, 1792.—*Salmo lycaodon*, Pallas, 1811.—*Salmo japonensis*, Pallas, 1811.—*? Salmo paucidens*, Richardson, 1836.—*Salmo consuetus*, Richardson, Voyage of the Herald, 1854.—*Salmo dermatinus*, Richardson, *l. c.* 1854.—*Salmo canis*, Suckley, 1861.—*Salmo cooperi*, Suckley, 1861.—*Salmo scouleri*, Suckley, 1861, (not of Rich.).—*Salmo truncatus*, Suckley, 1861.—*? Salmo richardi*, Suckley, 1861.—*Oncorhynchus lycaodon*, Günther, 1867.—*Oncorhynchus nerka*, Jordan, 1878.

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d. Depth of body about .29 of length, its width only about .10; length of head .29 of length; the interorbital space about .09; maxillary, .12; mandible, .19; scales moderate, thin, partly imbedded in the skin along the back, but not closely imbricated, in number about 20–135–20; branchiostegals about 15; dorsal fin rather high—higher than long; adipose fin long and narrow, somewhat spatulate; caudal fin well forked; general color red, somewhat spotted above; size small. (*Habitat.*—Pacific coast streams, Sacramento River to Fraser's River.) ..... KENNERLYI.*

The series of *Oncorhynchi* in the National Museum is by no means so complete as is desirable, except in the case of *O. quinnat* and *O. kennerlyi*. *O. keta*, *O. nerka*, and *O. gorbuscha* are represented only by skins, mostly dried and moth-eaten, and all in poor condition. A fuller series may show that more than five good species exist, or it may show that *O. quinnat* is really only a variety of *O. nerka*.

2. SALMO TSUPPITCH Richardson.

Tsuppitch Salmon. Black Trout of Lake Tahoe.

1836—*Salmo tsuppitch* RICHARDSON, Fauna Bor.-Am. Fishes, p. 224.
Salmo tsuppitch DEKAY, New York Fauna, Fishes, p. —, 1842.
Salmo tsuppitch STORER, Synopsis, p. 197, 1846.
Salmo tsuppitch HERBERT, Frank Forrester's Fish and Fishing, Suppl. p. 39, 1850.
Salmo tsuppitch SUCKLEY, Nat. Hist. Wash. Terr. p. 327.
Salmo tsuppitch GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 118, 1867.
Salmo tsuppitch SUCKLEY, Monograph Salmo, p. 111, 1874.
Salmo tsuppitch JORDAN, Man. Vert. ed. 2d, p. 358, 1876.

A fine specimen of a trout from the Clackamas River enables me to make a probably correct determination of the hitherto unidentified *Salmo tsuppitch* of Richardson. The specimen seems to be identical with the so-called "Black Trout of Lake Tahoe" (not the "Silver Trout of Lake Tahoe", which is the species termed by Professor Gill and myself *S. henshawi*"), of which numerous specimens were collected in Lake Tahoe and in Kern River, California, by Mr. H. W. Henshaw. I feel less hesitation in identifying Richardson's *tsuppitch* with this species, from the fact that the fish does not seem ever to have been renamed by later writers. The following description was taken from the Clackamas River specimen.

General appearance of *Salmo henshawi*, but with smaller scales, smaller, shorter head, and smaller mouth, besides wanting the hyoid teeth.

Body elongated, somewhat compressed, the dorsal region moderately elevated. Head rather small, pointed and lengthened, its form quite distinctly conic, less convex than in *spilurus*, the top rather narrow and slightly keeled. Mouth moderate, not large, with rather weak teeth, the maxillary comparatively narrow and not extending much

* *Oncorhynchus kennerlyi* (Suckley) Jor.—*Salmo kennerlyi*, Suckley, 1861.—*Hypsifario kennerlyi*, Gill, 1864.—*Oncorhynchus kennerlyi*, Jordan, 1878.

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beyond the eye; opercle more prolonged backwards than in *spilurus*, making the head appear longer. Pectoral fins smaller than in *spilurus*.

Scales small, silvery, 28–180–29.

Caudal fin short, rather faintly forked, but more so than in *spilurus*. Adipose fin rather small. Fins all small, the dorsal of the usual "*salar*" pattern.

Fin-rays: Dorsal, 2, 11. Anal, 2, 10.

Color dark above; head, body, and upper fins with small, round, black spots, very numerous, and nearly as close together before as behind; a few spots on the belly in some specimens.

Measurements of specimen: Length, 12 inches; depth, .23½ of length to base of caudal; head, .24½; interorbital width, .07; maxillary, .10; mandible, .15; middle caudal rays, .11; outer caudal rays, .17.

This species may be known from *S. spilurus* by the more forked tail, the longer and slenderer head, and the greater spottiness anteriorly. From *S. irideus*, it may be known by the much slenderer form, larger mouth, longer head, and much larger scales; from *S. henshawi*, which it most resembles, by the shorter head and by the lack of hyoid teeth; and from *S. clarki*, which it also resembles, by the want of hyoid teeth, and other characters.

These black-spotted Salmon of the Rocky Mountain region and Pacific slope belong to a well-marked group, for which the name *Salar*, Valenciennes, may be retained as a subgenus of the genus *Salmo*. Although not by any means so different from the true *Salmo* (type *S. salar* L.) as are the genera *Oncorhynchus*, *Cristivomer* (type *S. namaycush* Walb.), and *Salvelinus* (type *S. salvelinus* L.), it is not impossible that future writers may consider *Salar* as a genus distinct from *Salmo*. The character of a single instead of a double row of teeth on the shaft of the vomer, supposed to distinguish *Fario*, Val., from *Salar*, has no generic value, and probably not even a specific value, at least as hitherto stated. In all the species properly referable to *Salar*, the teeth are arranged alternately, each one pointing to the right or left, in an opposite direction from its neighbor. These teeth are therefore in a sort of quincuncial row, which in many or most instances appears as two distinct rows, and almost always is divided into two anteriorly. Most of the "Salmon-trout" and "Trout" of Europe and Asia belong to this group, "*Salar*". Although most of the species referred to *Fario* belong to *Salar*, it is not certain whether the type of *Fario*, *F. argenteus* Val., from France, is a *Salar* or a true *Salmo*. The figure looks to me like a young Salmon (*S. salar*).

The American species of the subgenus *Salar* which are now considered valid by Dr. Gill and myself may be compared as follows:—

Common characters:—River Salmon, not anadromous, with the vomer comparatively flat and not boat-shaped, its form essentially as in *Salmo* proper, the vomerine teeth extending for some distance along the shaft of the bone in two alternating rows or in one zigzag row, the teeth divergent and directed somewhat forward, not deciduous: scales

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moderate, comparatively thin and loose, appearing silvery, especially in fishes which have entered the sea: fins small, the last rays of the dorsal somewhat elongate, the first ray usually less than twice the height of the last ray; caudal fin slightly forked, or more usually truncate, with a slight emargination, double-rounded when spread open: upper parts, especially the back, and the dorsal and caudal fins, more or less thickly covered with small, rounded, black spots; in some specimens, especially those which have been in the sea, these spots are more or less confluent, obscured or even obsolete: species not of the largest size, the sexual peculiarities not strongly marked ..... (Subgenus SALAR.)

a. Hyoid bone entirely destitute of teeth.

b. Scales comparatively large, in 120 to 150 transverse series.

c. Body more or less short and deep, compressed, the depth .24 to .33 of length. Head short, bluntish, convex above, obtusely carinate, about .25 of length: mouth small, smaller than in any other of the group, the maxillary bone of moderate width, scarcely reaching beyond the eye, .10 to .11 of length, the mandible about .15: eye large, about .05 of length: caudal fin moderately but very distinctly forked, more so than in any of the other members of the group; first long ray of dorsal about twice the height of the last ray: dorsal, 2, 11; anal, 2, 11: scales about 28–135–28, varying considerably, but in all cases decidedly larger than in any other of our species of *Salar*. Rivers from California to British Columbia west of the Sierra Nevada ..... IRIDEUS.

bb. Scales comparatively small, in 165 to 205 transverse series.

d. Caudal fin somewhat forked: head rather small, about .25 of length, pointed and lengthened, conical, the upper outline rather narrow and not much convex, the carina slight: mouth moderate, the maxillary comparatively narrow and extending much beyond the eye: opercle considerably prolonged backward: scales small, 28–180–29: depth about .24 of length: body nearly equally spotted before and behind. Rivers west of Sierra Nevada ..... TSUPPITCH.

dd. Caudal fin double-rounded or truncate, not at all forked in the adult.

e. Head not notably broad and flat, heavy and proportionally short, its upper outline strongly convex, both longitudinally and transversely: mouth very large, the maxillary extending much past the eye in the adult, the opercle not especially prolonged backward: dorsal fin notably high behind, its last rays more than ½ the height of the first, some of the middle rays shortest: scales small: depth of body about .24 of length: spots on body most numerous posteriorly. Rocky Mountains to the Sierra Nevada south of the Columbia region ..... SPILURUS.

x. Scales medium, in 170 to 190 transverse rows: top of head gibbous, obtusely carinated. Headwaters of Rio Grande, Bear River, etc.
Subspecies *spilurus*.*

xx. Scales small, in 190 to 205 rows: head more or less sharply carinated, much less gibbous. Generally distributed.
Subspecies *pleuriticus*.†

aa. Hyoid bone with an elongate band of small teeth between the bases of the first and second pairs of gill-arches (readily scraped off by careless observers, and possibly sometimes naturally deciduous).

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* *Salmo spilurus* Cope, 1872.—*Salmo stomias* var. *spilurus* Jordan, 1878.

† *Salmo pleuriticus* Cope, 1872.—*Salmo stomias* var. *pleuriticus* Jordan, 1878.

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f. "Head large, broad, flat, not keeled, 4.25 in total length, equal to depth of body: muzzle obtuse: eye nearly 5 times in head: scales (small, as in var. *pleuriticus*) 42 below first dorsal ray: dorsal fin equidistant: caudal fin not notched. Kansas River."—(Cope.).....STOMIAS.*

ff. Head comparatively large, and long acuminate, .25 of length, its outline as a whole pointed, but the muzzle itself bluntish, its upper surface not much convex in either direction, very slightly carinated: mouth medium, the maxillary moderate, .12 of length, not reaching much beyond eye: patch of hyoid teeth small, and comparatively weak: body elongate, not greatly compressed, the depth .25 of length: dorsal fin small, its last rays ½ the height of the first: caudal fin short, quite distinctly forked: scales small, in 160 to 184 transverse rows: colors rather dark, back and sides more or less profusely covered with small rounded spots. Streams of California west of the Sierra Nevadas; Lake Tahoe.....HENSHAWI.†

fff. Head comparatively short and thick, .22 to .25 of length, its outline more convex, more or less distinctly carinated above: mouth rather small, but larger than in *irideus*, the maxillary not reaching far beyond the eye: patch of hyoid teeth well developed: body moderately elongate, compressed; depth .24 of length: dorsal fin rather low, its last rays ⅔ the height of the first: caudal fin scarcely forked, rather more so than in *spilurus*: scales moderate or rather small: colors variable, the back and sides usually profusely, but variably spotted, silvery in sea-run individuals. Rio Grande to Upper Missouri and west to the Pacific.....CLARKI.

y. Scales moderate, in 155 to 165 rows; chiefly west of the Rocky Mountains.....Subspecies *clarki*.

yy. Scales small, in 165 to 170 rows; chiefly east of the Rocky Mountains.....Subspecies *aurora*.

The American species of this subgenus *Salar* are very closely interrelated, and might almost be considered as varieties of a single polymorphous species. The occurrence of forms apparently intermediate prevents me from considering *aurora* and *pleuriticus* as distinct species, although they may usually be readily recognized.

Of the true subgenus *Salmo*, there seems to be but one species in America, the *Salmo salar*, our specimens being, so far as I can see, precisely identical with the European. The land-locked Salmon of Maine, *Salmo sebago*, Girard, does not differ by any constant character from *Salmo salar*, and its permanent residence in fresh water is the only character of which I know on which a subspecies *sebago* could be based. Land-locked Salmon from Bergen, Sweden, in the United States National Museum, and land-locked Salmon from Sysladobsis Lake, Maine, are to my eye precisely alike, and both are *Salmo salar*, Linnæus.

* *Salmo stomias* Cope, 1872.—I have not seen this species, but Professor Cope writes me that if I had, I would certainly consider it specifically distinct from *S. pleuriticus*. Since the above was in type, I have examined a head of a large specimen of *Salmo stomias* from the Upper Missouri. It agrees fully with Professor Cope's description. As it is a species with well-developed hyoid teeth, it is related to *S. clarki*, and *S. henshawi*, differing in the peculiar form of the head and the smaller size of the scales.

† *Salmo henshawi* Gill & Jordan, Jordan, Man. Vert. ed. 2d, p. 358, 1878.—This fine species is named in honor of Mr. H. W. Henshaw, the well-known ornithologist, who first brought specimens from Lake Tahoe.

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3. SALMO IRIDEUS Gibbons.

Pacific Coast Brook Trout.

1855—*Salmo iridea* GIBBONS, Proc. Cal. Ac. Nat. Sc. p. 36.
Salar iridea GIRARD, Proc. Ac. Nat. Sc. Phila. p. 220, 1856.
Salar iridea GIRARD, Pac. R. R. Expl. Fishes, p. 321, 1858, pl. 73, f. 5, and pl. 74.
Salar irideus JORDAN, Catalogue Fishes N. A. p. 431, 1878.
Salmo irideus GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 119, 1867.
Salmo iridea SUCKLEY, Monograph Genus Salmo, p. 129, 1874.
Salmo irideus JORDAN & COPELAND, Check List, p. 144, 1876.
Salmo irideus HALLOCK, Sportsman's Gazetteer, and of writers on fish and fish-culture generally.
Salmo irideus JORDAN, Man. Vert. ed. 2d, p. 358, 1878.
Salmo rivularis AYRES, Proc. Cal. Ac. Nat. Sc. p. 48.

1856—*Fario gairdneri* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 219, (not *Salmo gairdneri* Rich., a species with the "caudal fin semilunate" and "no hyoid teeth"; hence neither the present fish nor *S. clarkii* Rich.).
Fario gairdneri GIRARD, Pac. R. R. Expl. Fishes, p. 313, pl. 71, f. 1–4, 1858.

1858—*Fario newberrii* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 224, 1858, (substitute for *gairdneri*).
Salmo newberrii SUCKLEY, Monograph Genus Salmo, p. 159, 1874.
Salmo newberryi JORDAN & COPELAND, Check List, p. 144, 1876.

1858—*Fario clarkii* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 219, (not *Salmo clarkii* Rich.).
Fario clarkii GIRARD, Pac. R. R. Expl. Fishes, p. 314, pl. 71, f. 5–8, 1858.

1860—*Salmo masoni* SUCKLEY, Nat. Hist. Washington Terr. p. 345, (substitute for *clarkii*).
Salmo masoni SUCKLEY, Monograph Salmo, p. 134, 1874.
Salmo masoni JORDAN & COPELAND, Check List, p. 144, 1876.

1860—? *Salmo gairdneri* SUCKLEY, Nat. Hist. Washington Terr. p. 331, (not of Richardson).
? *Salmo gairdneri* SUCKLEY, Monograph Salmo, p. 114, 1874.

1867—*Salmo purpuratus* GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 116, 1867, (in part; probably not of Pallas, whose specimens came from Siberia, = *Salmo mykiss* Walbaum, = *Salmo mulkisi* Bloch, both names prior to Pallas, who gives "Mykiss" as the vernacular name of *purpuratus*).

Habitat.—California to British Columbia, in streams of or west of the Sierra Nevada and Cascade Ranges.

This abundant Trout is represented by several specimens. In justification of the above synonymy, I may say that I have examined specimens purporting to be the types of *irideus* Gibbons, *rivularis* Ayres, *newberrii* Girard, *masoni* Suckley, and *gairdneri* Suckley, and that I have no hesitation in considering all (excepting *gairdneri* Suckley) as representatives of a single species.

The type of *S. newberrii*, which Dr. Suckley was unable to find, is a well-preserved young fish, without hyoid teeth. It has a rather wider maxillary than is usual in *irideus* and rather smaller scales (33–146–33), and the vomerine teeth are in a single, somewhat zigzag row. Nevertheless, I believe it to be an *irideus*, with which it agrees in every other respect.

The types of *S. masoni*, the one a moth-eaten skin and the other a specimen in alcohol, are not different in any respect from the ordinary *irideus*. Notwithstanding Dr. Suckley's statement that the scales in his type are "double the size of *irideus*", his typical specimens have each about 130 scales in a longitudinal series, which is about the usual number in *irideus*.

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The type of *S. gairdneri*, Suckley, is a large stuffed skin, badly stretched, and in very poor condition. I am not able certainly to identify it.

As Dr. Günther found about 130 rows of scales in his *S. purpuratus*, I have referred it to the present species rather than to *S. clarki*. As elsewhere stated, I consider it rather unsafe to identify *fresh-water* Salmon from America and Asia as belonging to the same species before the species of either region have been critically studied.

4. SALMO CLARKI Richardson.

Subspecies CLARKI.

Salmon Trout of the Columbia.

1836—*Salmo clarkii* RICHARDSON, Fauna Boreali-Americana, iii, p. 224.
Salmo clarkii STORER, Synopsis, p. 197, 1846.
Salmo clarkii HERBERT, Frank Forrester, Fish and Fishing, Supplement, p. 40, 1850.
Salmo clarkii SUCKLEY, Nat Hist. Washington Terr. p. 344, 1860.
Salmo clarkii SUCKLEY, Monograph Genus Salmo, p. 112, 1874.
Salmo clarkii JORDAN, Man. Vert. ed. 2d, p. 359, 1878.
Salar clarkii JORDAN, Catalogue Fishes N. A. p. 430, 1876.
1856—*Fario stellatus* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 219.
Fario stellatus GIRARD, Rept. Pac. R. R. Expl. p. 316, pl. 69, f. 5–8, 1858.
Fario stellatus SUCKLEY, Nat. Hist. Wash. Terr. p. 346, pl. 69, f. 5–8, 1860.
Salmo stellatus GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 117, 1867.
Salmo iridea var. *stellatus* SUCKLEY, Monograph Genus Salmo, p. 130, 1874.
1856—*Fario tsuppitch* GIRARD, Proc. Ac. Nat. Sci. Phila. viii, p. 218, (not *Salmo tsuppitch* Rich.).
Fario tsuppitch GIRARD, Rept. Pac. R. R. Surv. Fishes, p. 300, 1858.
1858—*Salmo gibbsii* SUCKLEY, Ann. N. Y. Lyc. Nat. Hist. vii, p. 1, 1858, (substitute for *tsuppitch* Grd.).
Salmo gibbsii SUCKLEY, Nat. His. Wash. Terr. p. 332, 1860.
Salmo gibbsii GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 119, 1867.
Salmo gibbsii SUCKLEY, Monograph Genus Salmo, p. 141, 1874.
Salmo gibbsii JORDAN & COPELAND, Check List, p. 144, 1876.
1861—*Salmo brevicauda* SUCKLEY, Ann. N. Y. Lyc. Nat. Hist. vii, p. 308.
Salmo brevicauda GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 120, 1867.
Salmo brevicauda SUCKLEY, Monograph Genus Salmo, p. 140, 1874.
Salmo brevicauda JORDAN & COPELAND, Check List, p. 144, 1876.

Subspecies AURORA.

Missouri River Trout. Utah Trout. Yellowstone Trout.

1856—*Fario aurora* GIRARD, Proc. Ac. Nat. Sc. Phila. viii, p. 218.
Fario aurora GIRARD, Pac. R. R. Surv. Fishes, p. 308, pl. 68, 1858.
Salmo aurora SUCKLEY, Nat. Hist. Wash. Terr. p. 343, 1860.
Salmo aurora GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 119, 1867.
Salmo aurora SUCKLEY, Monograph Genus Salmo, p. 110, 1874.
Salmo aurora JORDAN & COPELAND, Check List, p. 144, 1876.
Salmo clarkii var. *aurora* JORDAN, Man. Vert. ed. 2d, p. 359, 1878.
1856—*Salar lewisi* GIRARD, Proc. Ac. Nat. Sci. Phila. viii, p. 219, 1856.
Salar lewisi GIRARD, Pac. R. R. Surv. Fishes, p. 29, pl. 71, 1858.
Salmo (Salar) lewisi SUCKLEY, Nat. Hist. Wash. Terr. p. 348, 1860.
Salmo lewisi GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 122, 1867.
Salmo lewisi SUCKLEY, Monograph Genus Salmo, p. 139, 1874.
Salmo lewisi JORDAN & COPELAND, Check List, p. 144, 1876.

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1856—*Salar virginalis* GIRARD, Proc. Ac. Nat. Sc. Phila. viii, p. 220, 1856.
Salar virginalis GIRARD, Pac. R. R. Expl. Fishes, p. 320, 1858.
Salmo (*Salar*) *virginalis* SUCKLEY, Nat. Hist. Wash. Terr. p. —, 1860.
Salmo virginalis GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 123, 1867.
Salmo virginalis COPE, Hayden, Geol. Surv. Montana, 1871, p. 469, 1872.
Salmo virginalis SUCKLEY, Monograph Genus Salmo, p. 135, 1874.
Salmo virginalis COPE & YARROW, Zoöl. Lieut. Wheeler's Expl. W. 100th Mer. p. —, 1876.
Salmo virginalis JORDAN & COPELAND, Check List, p. 144, 1876.
1872—*Salmo carinatus* COPE, Hayden's Geol. Surv. Montana, 1871, p. 471, 1872.
Salmo carinatus JORDAN & COPELAND, Check List, p. 144, 1876.
1874—*Salmo utah* SUCKLEY, Monograph Genus Salmo, p. 136, 1874.
Salmo utah JORDAN & COPELAND, Check List, p. 144, 1876.

Examination of a very large series of the Salars with hyoid teeth has convinced the writer that all (excepting *S. stomias* and *S. henshawi*) belong to a single species, although two, and possibly three, or even four subspecies or varieties may be distinguished. For this species the name *Salmo clarki* is the name to be retained, as almost the only important character which Richardson was able to assign to this species is that of the patch of teeth on the hyoid bone. No other species of this group possessing this character is as yet known from the Columbia.

Specimens examined from Utah, from the Rio Grande, from the headwaters of the Missouri, Yellowstone, Platte, and Snake Rivers, as well as the types of *Fario aurora* from the Columbia, possess much smaller scales than typical *clarki* (*i. e.*, *stellatus* Grd.). These may be really specifically distinct, but intermediate specimens occur; and until this Rocky Mountain species can be better defined as distinct from the Columbia River species, it is best to consider it as var. *aurora* of the latter.

The typical specimens of *Fario stellatus* Girard are still preserved. I consider them as typical of *Salmo clarki*. This perfectly distinct species is almost the only one described by previous writers, which Dr. Suckley ventured to discard, he confounding it with *S. irideus*, yet of all our species of *Salar*, *irideus* and *clarki* (*stellatus*) are technically the most distinct.

The types of *S. brevicauda* Suckley are still preserved, but are almost decayed. One of them is certainly a *clarki*, probably sea-run; the other is past recognition.

The types of *Fario aurora* are still preserved in the same condition as when first described and figured. They are well kept as to the bodies, but the scales are all rubbed off, an accident apparently not noticed by Dr. Girard's artist, which accounts for the peculiar squamation shown in the published figure. These specimens are young, and very chubby; but as they have hyoid teeth and show no points of distinction from *S. lewisi* Grd., I identify them as belonging to the same species. The remarks of Dr. Suckley on the description of such specimens as new species are so pertinent that I will quote them here. They would perhaps have sounded better, however, if he himself had suppressed his own *Salmo warreni*, *Salmo gibbsii*, and other more or less purely complimentary species.

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"The naming of *Salmonidæ*, and the description of new species, based on the characters of young, partially grown fish, cannot be too strongly reprobated. There is already too much confusion in the synonymy of the different kinds; and if the practice of describing and naming new species from the characters of unidentified immature individuals is not stopped, the study of the relations of the species will become so complicated, that useful classification will be next to impossible, and the principal object and usefulness of scientific arrangement, such as simplifies the study of natural history in other branches, will be greatly impaired."—(Suckley, Monograph Salmo, p. 113.)

The types of *Salar lewisi* are still preserved. The one figured by Girard seems to be a female specimen, in very flabby condition. It is quite deep-bodied and has a smaller head and mouth than is usual in this species. Other specimens from the same waters agree more or less completely in these respects with *S. virginalis*, so that it does not seem possible to consider the Missouri River Trout as even varietally distinct.

The types of *Salmo carinatus* I have not seen. They were from the Yellowstone, and so far as the description is concerned seem to belong to this species.

The types of *Salar virginalis* are likewise preserved. They represent the ordinary form of this species in the Rocky Mountain region, and hence are typical of what I call var. *aurora*.

The original type of *Salmo gibbsii*, a stretched skin in poor condition, is now lost. If the species is not identical with *Salmo clarki*, it is likely to remain uncertain.

Salmo clarki Richardson is identified by Dr. Günther with *Salmo purpuratus* Pallas (*Salmo mykiss* Walbaum) of Kamtschatka. Günther's *Salmo purpuratus*, however, appears to be *Salmo irideus*, and not the present species, and an identification of a *fresh-water* salmon from California with a Kamtschatkan salmon is very uncertain. In regard to the migratory salmon, however, the case is different.

5. SALVELINUS SPECTABILIS (Girard) Gill & Jordan.

Pacific Red-spotted Trout.

1856—*Salmo spectabilis* GIRARD, Proc. Ac. Nat. Sc. Phila. p. 218, (not *Salar spectabilis* Valenciennes).
Salmo spectabilis GIRARD, Pac. R. R. Expl. Fishes, p. 307, 1858.
Salmo spectabilis SUCKLEY, Nat. Hist. Wash. Terr. p. 342, 1860.
Salvelinus spectabilis JORDAN, Man Vert. ed. 2d, p. 360, 1878.
Salvelinus spectabilis JORDAN, Cat. Fishes N. A. p. 430, 1878.
1861—*Salmo parkei* SUCKLEY, Ann. Lyc. Nat. Hist. N. Y. vii, p. 309.
Salmo parkii GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 121, 1867.
Salmo parkei SUCKLEY, Monograph Genus Salmo, p. 149, 1874.
Salmo parkei JORDAN & COPELAND, Check List, p. 144, 1876.
Salmo parkii HALLOCK, Sportsman's Gazetter, p. 347.
1861—*Salmo campbelli* SUCKLEY, Ann. Lyc. Nat. Hist. vii, p. 313, (substitute for *spectabilis*).
Salmo campbelli GÜNTHER, Cat. Fishes Brit. Mus. vi, p. 148, 1867.
Salmo campbelli SUCKLEY, Monograph Genus Salmo, p. 118, 1874.
Salmo campbelli HALLOCK, Sportsman's Gazetteer, p. 349.

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The Charrs, or *Salvelini*, form a strongly marked group, which has several times been distinguished as generically or subgenerically different from the true Salmons. The absence of teeth on the shaft of the vomer has been the character most usually relied on to distinguish the Charrs. A more important character is, however, seen in the form of the bone, which is boat-shaped, with the shaft short and depressed. The Charrs are further distinguishable by the very small size of the scales, and also by the coloration, they being always red-spotted, and with the lower fins peculiarly colored.

No one who examines the skull of the Charr can doubt its generic distinctness from *Salmo*. The question of the nomenclature of the genus is a matter perhaps of some uncertainty. The group has long been known as *Salvelini*, but that name was hardly given by Nilsson in the usual generic or subgeneric sense, but merely as a plural noun referring to an assemblage of species.

In 1836, Richardson used the name *Salvelinus* for the "subgenus" of Charrs. The use of the name in nomenclature therefore dates from Richardson.

In 1842, DeKay founded his genus *Baione* on the young of one of the species of Charr (*S. fontinalis*); *Baione* is therefore a synonym of *Salvelinus*, although given under a different supposition.

Somewhat later, the genus *Umbla* was proposed by Rapp for those *Salvelini* which have teeth on the hyoid bone. As *Salmo salvelinus* L., the presumable type of *Salvelinus*, has such teeth, *Umbla* probably is also a mere synonym of *Salvelinus*. That the character of hyoid teeth is not a generic one in this case is evident from the close relationship of such species as *S. oquassa* and *S. spectabilis*, with hyoid teeth, with *S. fontinalis* and *S. bairdi*, species destitute of such teeth. The teeth in *S. spectabilis* and *S. oquassa* are too few and small for their absence or presence to be a generic character. In the subgenus *Salar*, the case is precisely the same.

In 1867, Dr. Günther proposed a genus *Hucho* for the *Salvelini* without hyoid teeth. The genus cannot stand on that basis, but nevertheless it appears to be valid, its type, *Salmo hucho* L. (*Hucho germanorum* Günther), being a Pike-like fish, very unlike, both in form and habits, the genuine species of *Salvelinus*. The single known species of *Hucho* as thus restricted, inhabits the Danube.

The remaining subdivision of the old genus *Salmo*, for which the name *Cristivomer* has been proposed by Dr. Gill and myself, is peculiar to the lakes of the northern part of America.

The relations of *Cristivomer* are entirely with *Salvelinus*, a fact which has not hitherto been noticed. Its vomer differs, however, from that of *Salvelinus* in being provided with a raised crest flush with the head or chevron of the bone. This crest is posteriorly free from the vomer for some distance, and is armed with a series of stout teeth. There is also a strong band of hyoid teeth, the dentition generally being more complete than in most other Salmons.

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The scales in *Cristivomer* are quite small, and the species are *gray-spotted*. There are probably but two species, *Cristivomer namaycush** (Walbaum) and *Cristivomer siscowet* (Agassiz).

The species of *Salvelinus* known within the limits of the United States are compared below. The species from British America, *Salvelinus stagnalis* (Fabricius) (= *S. nitidus* and *S. alipes* Rich.), *S. rossi* Rich., *S. hoodi* Rich., *S. lordi* Günther, *S. arcturus* Günther, and *S. tudes* Cope, I have not seen. Most or all of them are probably valid. *Salvelinus bairdi*, of the Pacific coast, is very near *Salvelinus fontinalis*, and may be a variety of it; but never having seen it in life, I am not by any means prepared so to consider it.

Common characters:—River Salmon, not anadromous, with the vomer boat-shaped, somewhat carinate below; a few teeth on the posterior part of the chevron; none on the depressed shaft: scales very small, more or less imbedded in the skin, in 200–250 transverse series, those of the lateral line considerably enlarged. fins moderate, the last ray of the dorsal not lengthened, shorter than any of the other developed rays; caudal fin rather short, usually but little emarginate in the adult, forked in the young: sides of the body with round red spots; lower fins with a pale marginal band anteriorly, succeeded by a darker band; in sea-run specimens, these spots and other markings are often obliterated, and a more or less uniform silvery tint prevails: species not of the largest size, the sexual peculiarities not very strongly marked, the adult male usually with a fleshy projection at the tip of the lower jaw, which fits into a slight emargination of the upper jaw.

a. Hyoid bone provided with a median band of teeth.

b. Body elongate, slender, considerably compressed, the depth about .20 of the length of the body: caudal peduncle long and slender: head quite small, .21 of length of body; its upper surface flattish, .13½ of length, the interorbital space about .07: mouth quite small, the maxillary short and moderately broad, .08 of length, not extending to the posterior margin of the eye; mandible .12 of length; snout, .05: scales quite small, in about 230 transverse rows: caudal fin well forked; adipose fin rather small: coloration dark blue, the red spots confined to the sides of the body, round, smaller than the pupil: hyoid teeth numerous, small. Lakes of Maine ..... OQUASSA.†

bb. Body stout, not greatly compressed, the back elevated, the depth .24 of the length: head large, stout, broad, and flattened above, about .28 of length, its upper surface .17 of length, the interorbital space .08: mouth large, the maxillary extending beyond the eye .11 of length; the mandible, .16; the snout, .07: hyoid bone with very few (3 or 4), rather strong teeth (sometimes deciduous): fins short, the caudal slightly forked; adipose fin unusually large, its length in adults nearly twice that of the eye: scales very small, in about 240 transverse rows: red spots on the sides quite large, about the size of the pupil; back covered with very distinct spots, similar to those on the sides, but rather smaller, the dorsal spots said to be cream-colored or greenish in life, rather than red. Streams west of the Sierra Nevada ..... SPECTABILIS.

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* Namaycush Salmon, Pennant.—*Salmo namaycush* Walbaum, 1792, = *Salmo namaycush* Bloch, 1801, = *Salmo pallidus* Rafinesque, 1817, = *Salmo amethystus* Mitchill, 1818, = *Salmo confinis* DeKay, = *Salmo symmetrica* Prescott, 1851, = *Salmo adarondacus* Norris, 1864, = *Salmo toma* Hamlin, 1863.

† *Salvelinus oquassa* (Girard) Gill & Jordan.—*Salmo oquassa*, Girard, 1854.

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aa. Hyoid bone without teeth.

c. Body elongate, moderately compressed, not much elevated, the depth .23 of length: head large and long, notably so in the adult, nearly .30 of length, .22 to .25 in the young; top of head .14 to .18 of length; interorbital space broad, .07 to .08½ of length; snout rather conical and pointed, .09 of length, blunter in the young; mandible .22 of length in adult, .15 in young: eye small, nearly in a line with the axis of the body: scales very small, similar to those in the other species, in about 230 transverse rows: caudal fin little forked; adipose fin quite small, shorter than the eye; pectoral and ventral fins not elongate: red spots about the size of the pupil, confined to the sides of the body, the back being nearly plain. Rivers west of the Sierra Nevada.....BAIRDI.*

cc. Body oblong or elongate, moderately compressed, not much elevated, the depth .20 to .30 of length: head large, but not very long, its length .21 to .24 of length, the top about .14, the rather broad interorbital space about .07: mouth large, the maxillary reaching more or less beyond the eye, about .10 of length; the mandible about .15: eye large, more or less above the line of the axis of the body: scales very small, in about 230 transverse rows: caudal fin slightly lunate in the adult, forked in the young; adipose fin small; pectoral and ventral fins not especially elongate: red spots on body chiefly confined to the sides, rather less than the size of the pupil; the back and vertical fins more or less barred or mottled; coloration often plain in sea-run individuals. Rivers from Little Tennessee in Georgia to Lake Superior and Hudson's Bay. FONTINALIS.†

The original type of *S. spectabilis* and of *S. campbelli*, the latter being merely a substitute name, is still preserved in the National Museum. Although badly decayed, its identity with the species here called *spectabilis* is evident. The types of *Salmo parkei* are now lost, but that the species is the same as *S. spectabilis* seems unquestionable. The name *spectabilis* should now be retained for this fish, as the *spectabilis* of Valenciennes, being a *Salar*, belongs to a different genus.

6. GILA OREGONENSIS (Richardson) Jordan.

1836—*Cyprinus* (*Leuciscus*) *oregonensis* RICHARDSON, Fauna Bor.-Americana, iii, p. 305.
Leuciscus oregonensis DEKAY, New York Fauna, Fishes, p. 215, 1842.
Leuciscus oregonensis CUV. & VAL., Hist. Nat. des Poissons, xvii, p. 326, 1844.
Leuciscus oregonensis STORER, Synopsis Fishes N. A. p. 412, 1846.
Ptychocheilus oregonensis GIRARD, Proc. Ac. Nat. Sc. Phila. p. 209, 1856.
Ptychocheilus oregonensis GIRARD, Pac. R. R. Expl. Fishes, p. 298, pl. 64, figs. 5–9, 1858.
Leuciscus oregonensis GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 239, 1868.
Ptychochilus oregonensis JORDAN & COPELAND, Check List of Fishes, p. 151, 1876.
Gila oregonensis JORDAN, Catalogue Fishes N. A. p. 424, 1878.
1855—*Ptychocheilus gracilis* AGASSIZ, Am. Journ. Sci. Arts, xix, p. 229.

Specimens from the Clackamas River agree in all essential respects with the descriptions given by Agassiz, Girard, and Günther. The

* *Salvelinus bairdi* (Suckley) Gill & Jordan.—*Salmo bairdii*, Suckley, 1861.

† *Salvelinus fontinalis* (Mitchill) Gill & Jordan.—*Salmo fontinalis*, Mitchill, 1814.—*Salmo allegheniensis*, Rafinesque, 1820.—*Salmo nigrescens*, Rafinesque, 1820.—? *Salmo hearnii*, Rich., 182–.—*Salmo canadensis*, H. Smith, 1834.—*Salmo erythrogaster*, DeKay, 1842.—*Baione fontinalis*, DeKay, 1842.—*Salmo immaculatus*, H. R. Storer, 1850.—*Salmo hudsonicus*, Suckley, 1861. The names *immaculatus* and *canadensis* were given to the Canadian Salmon-Trout, which is a Brook-Trout run into the sea.

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teeth are 2, 4–5, 2, not 2, 5–5, 2, and the folding of the lips, which suggested the name *Ptychochilus*, is not an evident feature to me.

This species, which is the type of the genus *Ptychochilus*, is a true species of the genus *Gila* as the characters of that genus are now understood. The general physiognomy is similar, the head is long, slender, and depressed, the mouth is very large and overlapped by the snout, the caudal peduncle is slender; the scales are similarly small and loosely imbricated, the dorsal fin is slightly behind the ventrals, the anal fin is not elongate; the lips are normal; the pharyngeal teeth are two-rowed, the inner row 5–4 or 5–5, and the intestinal canal is short. In all these respects, the type of *Ptychochilus* agrees with the type of *Gila*, and as no generic difference has been shown, *Ptychochilus* becomes a synonym of *Gila*. At present, the fishes called *Clinostomus* by Girard are referred to *Gila*. The two groups ought to be generically distinguishable. The typical species of each are very different in physiognomy, but at present, as has been shown by Professor Cope, we are unable to draw a line between them.

The other species referred to *Ptychochilus* are probably distinct from *oregonensis*, but should be compared with species of *Gila* and with each other. If *rapax* and *lucius* have really the teeth 2, 4–4, 2, it may be necessary to frame a separate genus for them, as they would hardly be referable to *Notropis* or to *Gila*.

7. ACROCHILUS ALUTACEUS Agassiz & Pickering.

Hard-Mouths.

1855—*Acrocheilus alutaceus* AGASSIZ & PICKERING, Amer. Journ. Sci. Arts, xix, p. 96.
Lavinia alutacea GIRARD, Proc. Ac. Nat. Sc. Phila. 1856, p. 184.
Acrochilus alutaceus GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 276, 1868.
Acrochilus alutaceus JORDAN & COPELAND, Check List Fishes, p. 146, 1876.
Acrochilus alutaceus JORDAN, Catalogue Fishes N. A. p. 418, 1878.

Several fine specimens of this very interesting species are in Mr. Stone's collection. As no detailed account has been given of the fish, and as none of the authors mentioned in the above synonymy, excepting Professor Agassiz, seem ever to have seen it, I give a description of one of the specimens. The relations of this genus are doubtless with *Chondrostoma*, but its teeth are fewer and differently formed.

General form and appearance of the species of *Gila*, but the head not depressed, and more blunt forward.

Body elongate, not much compressed, its sides more so than the caudal peduncle; the greatest depth, over the ventrals, 4 in length; caudal peduncle very long and very slender, unusually broad, nearly terete, its length contained $4\frac{2}{3}$ times in the length of the body, its least depth $2\frac{2}{3}$ in length.

Head moderate, $4\frac{1}{4}$ in length of body, bluntish, the profile considerably rounded, the interorbital space strongly convex. Mouth horizontal,

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subinferior, overlapped by the broad, blunt snout, its breadth considerable, but the maxillary not extending far back, not to opposite the front of the eye. Upper jaw protractile, covered with a fleshy lip, inside of which is a small, straight, cartilaginous plate, similar to that on the lower jaw, but much smaller, and not evident externally. Lower lip covered with a firm cartilaginous plate, sharp externally, the upper surface being formed by its bevelled edge. The transverse width of this plate is between four and five times its (longitudinal) breadth. The plate extends in nearly a straight line from one angle of the mouth to the other; its transverse width is contained $2\frac{3}{4}$ times in the length of the head. Eye rather large, $5\frac{1}{2}$ in head, $1\frac{3}{4}$ in snout, its position anterior and not high up, $2\frac{1}{4}$ in interorbital space.

Fin-rays: Dorsal I, 10. Ventrals, 9. Anal I, 9. Dorsal long, rather low, its first ray just behind the first ray of ventrals, about over the middle of the latter fin, midway between the snout and the middle of the base of the caudal fin; caudal fin very long, the lobes about equal, longer than the head, widely forked, the accessory rays at its base very numerous and recurrent on the caudal peduncle; about eight of these may be distinguished on each side of the fin. Anal fin rather large; ventrals broad, not reaching vent. Pectorals moderate, not reaching two-thirds of the distance to the ventrals.

Scales quite small, somewhat imbedded in the skin, very loosely imbricated, or often scarcely imbricated at all, the exposed surfaces longer than high, profusely punctate; squamation quite irregular; the scales smaller on back and belly than on sides, most exposed on caudal peduncle. Scales 21–85–13. Lateral line broadly decurved.

Coloration very dark, belly paler, but nearly all parts of the body studded with minute dark points.

Teeth 5–4 (5 on the left side, 4 on the right), hooked, somewhat club-shaped, with a broad masticatory surface.

Peritoneum black; intestines much elongate, filled in this specimen with vegetable substance, apparently fine leaves and branches of a *Sphagnum*-like moss.

Length of specimen examined, one foot.

8. MYLOCHILUS CAURINUS (Richardson) Girard.

1836—*Cyprinus* (*Leuciscus*) *caurinus* RICHARDSON, Fauna Boreali-Americana, iii, p. 304.

Leuciscus caurinus DEKAY, Zoology N. Y. Fishes, p. 215, 1842.

Leuciscus caurinus CUVIER & VALENCIENNES, Hist. Nat. des Poissons, xvii, p. 325, 1844.

Leuciscus caurinus STORER, Synopsis Fishes N. Am. p. 159, 1846.

Mylocheilus caurinus GIRARD, Proc. Acad. Nat. Sci. Phila. p. 169, 1856.

Mylocheilus caurinus GIRARD, Pac. R. R. Expl. x, p. 213, pl. 46, f. 1–4, 1858.

Leucosomus caurinus GÜNTHER, Cat. Fishes Brit. Mus. vii, p. 270, 1868.

Mylochilus caurinus JORDAN & COPELAND, Bull. Buffalo Soc. Nat. Hist. p. 155, 1876, (name only).

Mylochilus caurinus JORDAN, Catalogue Fishes, p. 427, 1878.

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1855—*Mylocheilus lateralis*, AGASSIZ, Am. Journ. Sci. and Arts, p. 231.
Mylocheilus lateralis GIRARD, Proc. Acad. Nat. Sci. Phila. p. 169, 1856.
Mylocheilus lateralis GIRARD, Pac. R. R. Expl. p. 213, pl. 48, f. 5–8, 1858.
Mylochilus lateralis JORDAN & COPELAND, Bull. Buffalo Soc. Nat. Hist. p. 155, 1876.
1856—*Mylocheilus fraterculus* GIRARD, Proc. Acad. Nat. Sci. Phila. p. 169.
Mylocheilus fraterculus GIRARD, Pac. R. R. Expl. x, p. 215, pl. 45, f. 1–4, 1858.
Mylocheilus fraterculus COOPER, Nat. Wealth Cal. by Cronise, p. 496, 1868.
Mylochilus fraterculus JORDAN & COPELAND, Bull. Buffalo Soc. Nat. Hist. p. 155, 1876, (name only).

Habitat.—Northern California to British Columbia.

My specimens agree perfectly with Dr. Günther's description of his *Leucosomus caurinus*, which was taken in part from Richardson's original types, except that the size of the eye in my fishes is proportionally larger. Agassiz's account of *Mylocheilus lateralis* answers in a general way, except that I find no trace of anything which can be called a horny sheath on the jaws. There is nothing in Girard's trivial description of *Mylochilus fraterculus* to indicate distinction. I therefore follow Dr. Günther in considering *M. lateralis* and *M. fraterculus* as mere synonyms of *M. caurinus*. The genus *Mylochilus* resembles in form, squamation, etc., the genus *Gila*. It has, however, a much smaller mouth than most of the species of that genus. Its relations are rather with *Pogonichthys* and *Platygobio*, from both of which it differs in the peculiar form of its teeth as well as in the number of teeth. I find in the specimen before me the teeth 2, 5–5, 2, the teeth of the smaller row quite small and close together, and the innermost of the larger row much enlarged and truncate, gradually diminishing in size to the uppermost, which is slender, compressed, and hooked. I find no trace of a third row in my specimens.

The genus *Mylopharodon* Ayres is perfectly distinct from *Mylochilus*, the upper jaw being non-protractile, the dorsal behind the ventrals, and no barbel at the angle of the maxillary. *Mylopharodon* thus far apparently contains but a single species, the types of *Gila conocephala* B. & G. and *Mylopharodon robustus* Ayres being, so far as I can see, conspecific.

A REVIEW OF THE AMERICAN SPECIES OF THE GENUS SCOPS, SAVIGNY.

By ROBERT RIDGWAY.

Previous to the publication, some two years since, of Mr. R. B. Sharpe's admirable work on the *Strigidæ*,* I had paid considerable attention to the study of the American Scops-owls, but the lack of sufficient material prevented my reaching any very positive conclusion as to several forms of questioned validity. More recently, however, through the assistance of several friends, among whom I may name in particular Mr. Osbert

* Catalogue of the Striges, or Nocturnal Birds of Prey, in the Collection of the British Museum. By R. Bowdler Sharpe. London: Printed by order of the Trustees. 1875.

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Salvin, of England, and Mr. George N. Lawrence, of New York City (both of whom have kindly loaned me their entire series), I have been enabled to bring together a collection amply sufficient to settle former doubts.

The inference derived from a careful study of the material first in hand was, that a greater number of species existed than were usually recognized as valid; certain forms allied to *S. brasilianus* (Gmel.), named, but generally considered synonymous with some other species, being represented by typical specimens, while there were no examples of intermediate character, the differences between these several styles being moreover so obvious that it seemed scarcely possible they could intergrade. I was therefore quite convinced that additional material would confirm the view of their distinctness. Being thus prejudiced, as it were, in my views of the relationship of the several forms alluded to, I at first attempted to divide the new series accordingly. Determined and repeated efforts failed, however, until I fully realized the utter hopelessness of the attempt. Thus I was irresistibly, though quite against my previous convictions, led to the same conclusion as that reached by Messrs. Sclater and Salvin, and subsequently adopted by Mr. Sharpe, that the several supposed species allied to *S. brasilianus* are merely geographical, local, and individual variations of the same species. No other view seems justifiable, in view of the complete and unquestionable intergradation between the most extreme variations. The only alternative is to allow a very much greater number of forms even than have been named, admitting at the same time the intergradation of each with the other.

It has been remarked by an eminent author* that few, if any, birds vary more in their feral state, both individually and otherwise, than the owls, and that of all the genera of this family the present one is the most variable. In this opinion I fully agree, for I have rarely had a more difficult and, I may say, more unsuccessful task than my attempt to elucidate the several species and "races" treated in the present memoir.

In the first place, the plumage is characterized by confused markings in the form of zigzags, "herring-bone" *picturæ*, and minute vermiculations, having much the same general character in all, the difference between the several species in the pattern of coloration being exceedingly difficult of description. Next, there is the perplexing condition of "dichromatism", the same species having two very distinct phases of plumage—a gray phase, which may be considered the normal dress, and a rufous phase, which is an extreme development of the variation called "erythrism". These two extreme phases, which it is to be remembered do not depend at all upon age, sex, or season, being purely an individual peculiarity, are in each species so very unlike that corresponding phases of the several really distinct species resemble one

* Sharpe, *l. c.*, p. 44.

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another very much more closely than do the two extreme phases of any one species! The geographical variations are also unusually pronounced, while last, but by no means least of the obstacles presented, is the very great range of individual variation within even a limited area of country.

Genus SCOPS, Savigny.

= *Scops*, SAVIGN., Descr. de l'Égypte, 1809, 291 (type, *Strix scops*, Linn.).—CASS., in Baird, B. N. Am. 1858, 51.—COUES, Key, 1872, 202.—B. B. & R., Hist. N. Am. B. iii, 1874, 47.—< SHARPE, Cat. Strig. Brit. Mus. 1875, 43 (includes *Lophostrix*, Less.).

= *Ephialites*, KEYS. & BLAS., Wirb. Eur. 1840, p. xxxiii (type, *Strix scops*, Linn.—*Neo* Schrank, 1802).

† *Pisorhina*, KAUP, Isis, 1848, 769 (type, *Scops menadensis*, Quoy & Gaim.).

= *Megascops*, KAUP, l. c. (type, *Strix lempiji*, Horsf.).

† *Acnemis*, KAUP, l. c. (type, *Scops gymnopodus*, Gray).

† *Ptilopsis*, KAUP, l. c. (type, *Strix leucotis*, Temm.).

= *Lempijius*, BONAP., Rev. et Mag. de Zool. 1854, 542 (type, *Otus semitorques*, Schleg.).

Generic Characters.—Small owls with distinct ear-tufts, the tarsus more or less feathered (usually completely feathered), the wings ample (more than twice the length of the short, slightly rounded tail), the plumage exceedingly variegated with vermiculations, cross-bars, and mottlings; toes naked or bristled—never completely feathered, except toward the base.

The above brief diagnosis is sufficient to characterize this group. In general aspect the species of this genus are miniatures of those which belong to the genus *Bubo*, and are perhaps as nearly related structurally to the latter as to any other members of the family.

All the American species have the outer webs of the scapulars mostly light-colored (generally white, with a blackish terminal border—rusty-ochraceous in *flammeolus* and the darker forms of *brasilianus*), producing a more or less distinct stripe along each side of the dorsal region; the feathers of the upper and lower parts usually with blackish shaft-streaks, those beneath generally with narrow transverse bars; outer webs of the remiges with light-colored spots, and the tail more or less distinctly (never sharply) banded. All the species are, in some part of their range, dichromatic, having a bright rufous phase, quite different from the "normal" grayish plumage.

Key to the Species.

A.—Toes and lower half (or more) of tarsus completely naked	1. *S. nudipes.*
B.—Toes alone (or with merely lower end of tarsus) completely naked	2. *S. brasilianus.*
	3. *S. barbarus.*
	4. *S. flammeolus.*
C.—Toes strongly bristled, sometimes densely feathered at base	5. *S. asio.*
	6. *S. cooperi.*

By the above characters, the American species of this genus are readily divided into three groups. It now remains to distinguish

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between the species of each group, which is a much more difficult matter. Passing by group A., which contains only *S. nudipes*, the three species belonging to group B. may be distinguished as follows:—

a.—Toes stout, with strong claws. Wing exceeding 5.75 inches (rarely less than 6.00, and ranging to nearly 8.00 inches); tail more than 3.15 ..... 2. *S. brasilianus.*

b.—Toes weak and slender, with weak claws. Wing less than 5.75 inches (ranging in length from 5.10 to 5.60); tail less than 3.15 (2.60–3.10).

Feathers of the outer margin of the face with their shafts produced into slender, soft, hair-like, curved bristles, forming a conspicuous ruff, the anterior side concave. Plumage coarsely spotted, above and below ..... 3. *S. barbarus.*

Feathers of the outer margin of the face with their shafts not conspicuously developed. Plumage finely vermiculated, above and below, the outer scapulars having orange-buff spots on the outer webs..... 4. *S. flammeolus.*

The above brief diagnoses are probably sufficient to distinguish these three very distinct species in all their numerous variations. The differences are very much more easily perceived than defined, the birds having an entirely different aspect when compared with one another. Of the three, *S. brasilianus* varies almost indefinitely, but may always be known by its much stouter toes and stronger claws, as well as by its larger size, even in the smallest race (*S. cassini*), although the difference in dimensions is sometimes so slight as to be perceptible only by actual measurement. *S. barbarus* is distinguished by the coarseness of its markings, which partake of the character of roundish or transversely-oblong spots, rather than fine vermiculations, and by the peculiar development of the shafts of the facial feathers. *S. flammeolus* is slightly smaller than *S. barbarus*, and of quite different build, having an extremely light and slender body, with small head, the wings thus seeming very long in proportion. As to colors, it may ordinarily be distinguished from all the other species by the pronounced orange-buff tint of the outer webs of the outer row of scapulars, these being in most others white, or, if not white, of a more sombre shade of buff and fulvous, the plumage being otherwise quite different. According to Mrs. M. A. Maxwell, who has in her finely-mounted collection of Colorado birds a very beautiful specimen, the iris of this species is of a deep hazel, or umber-brown; should this prove constant, it will afford an excellent character, since the iris in nearly if not all the other species is known to be a bright lemon-, or gamboge-, yellow.

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A.—*Lower half or more of the tarsus completely naked, like the toes.*

1. SCOPS NUDIPES.

Bubo nudipes, VIEILL., Ois. Am. Sept. 1807, pl. 22.

Scops nudipes, CUV., Règ. Anim. 1829, 347.—STRICKL., Orn. Syn. I, 1855, 203.—LAWR., Ann. Lyc. N. Y. IX, 1868, 132 (*Costa Rica*).—SALVIN, P. Z. S. 1870, 216 (*Veragua*).—SCL. & SALV., Nom. Neotr. 1873, 117 (*Costa Rica to Columbia*).—SHARPE, Cat. Strig. Brit. Mus. 1875, 121 (*Veragua; Costa Rica*).—BOUC., Cat. Av. 1876, 91 (*Veragua*).

Ephialtes nudipes, GRAY, Genera B. I, 1844, 38.

Acnemis nudipes, BONAP., Rev. et Mag. de Zool. 1854, 542.

Strix psilopoda, VIEILL., Nouv. Dict. XVI, 1817, 46.

Hab.—Costa Rica and Veragua.

DIAGNOSIS.—"*Adult.* Above sandy rufous, vermiculated with black, much darker on the back than on the head, the dorsal feathers black in the centre, barred and spotted with sandy rufous, these bars more distinct on the scapulars, the outermost of which are silvery white, externally tipped with black; wing-coverts decidedly darker than the back, the innermost of the least series uniform blackish brown, the rest spotted and barred with sandy rufous, the bars especially broad on the greater series, some of which have a tolerably large buffy white spot near the tip of the outer web; spurious quills externally notched with sandy rufous, inclining here and there to whitish; primary coverts nearly uniform blackish brown, with a few bars of sandy rufous near the tips of the outer webs; quills blackish brown, the inner webs of the primaries quite uniform, excepting for a few yellowish bars near the bases of the interior feathers, the secondaries indistinctly barred with ashy brown on the inner webs, all the quills externally barred with sandy rufous, paler and more fulvous on the outer web of the primaries, the innermost secondaries mottled and barred with sandy rufous, and resembling the scapulars; tail blackish brown, with seven feebly indicated narrow bars of sandy rufous; head and neck decidedly clearer than the back, and somewhat inclining to chestnut, the feathers black in the centre, and laterally barred with the same, giving a generally barred appearance to these parts; lores and sides of face bright bay, the loral plumes blackish at tip, and the ear-coverts with a few indistinct cross bars of black; over the eye a few white-barred feathers, forming a faint eyebrow; ear-tufts lighter than the crown, orange rufous, broadly barred with black at the tips; under surface of body sandy rufous, many of the feathers coarsely vermiculated with black, the breast-feathers streaked and laterally barred with black, these black markings less distinct on the flanks and abdomen, on which parts are tolerably distinct bars of white; leg-feathers bright orange-rufous, with a few narrow brown bars on the tibia; under tail-coverts white, barred across with sandy rufous; under wing-coverts fulvous, thickly mottled with brown near the outer edge of the wing, which is white, the lower series dark brown, like the inner lining of the quills; bill yellowish;

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feet yellowish, claws horn-colour. Total length 10 inches, wing 6·8, tail 4·1, tarsus 1·55, bare part of latter 0·85. (*Mus.* Salvin and Godman.)

"*Obs.* My description is taken from a specimen obtained at Calobre, in Veragua, by Arcé, and kindly lent to me by Mr. Salvin. He has at the same time lent me another specimen, obtained by the same collector in Costa Rica. This latter bird differs in several points from the one described, having more of the general aspect of *Scops pennatus* of the Himalayas; it is clear sandy in colour, the black forming regular bars across the plumage, the subterminal one very broad, and giving the appearance of large black spots to the upper surface; feathers of the crown centred with black, the sandy-colored interspaces forming very distinct spots, the ear-tufts being still lighter, and barred across with whitish; the white spots on the scapulars, wing-coverts, and outer webs of primaries very distinct, as are also the white bars on the lower surface, many of them being apparent also on the chest-feathers; the quills barred with ashy brown on their inner webs, inclining to sandy buff on the secondaries. Total length 9·5 inches, wing 6·8, tail 4, tarsus 1·45, bare part of the latter 0·65."

The only specimens of this species which I have seen are several borrowed from Mr. Salvin, and returned to him without descriptions having been taken from them. I therefore quote Mr. Sharpe's account of the species (*l. c.*).

B.—*Toes only, or with, at most, the extreme lower portion of the tarsus, completely naked.*

2. SCOPS BRASILIANUS.

a. brasilianus.

Strix brasiliana, GMEL., S. N. I, i, 1788, 289 (ex Briss., I, 499).
Strix choliba, VIEILL., Nouv. Dict. xiv, 1817, 39 (ex Azara, Apunt. II, 218).
Strix decussata, LICHT., Verz. Doubl. 1823, 59.
Strix crucigera, SPIX, Av. Bras. I, 1825, 22, pl. 9.
Strix undulata, SPIX, *t. c.* pl. 10.
? *Scops lophotes*, LESS., Traité, I, 1831, 107.
Ephialites argentina, LICHT., Nomencl. 1854, 7.

β. atricapillus.

Strix atricapilla, "NATT.", TEMM., Pl. Col. II, 1838, pl. 145.
Ephialites watsoni, CASSIN, Pr. Phila. Acad. IV, 1849, 123.

γ. ustus.

Scops usta, SCL., P. Z. S. March 9, 1858, 132.

δ. guatemalæ.

Scops brasilianus, subsp. *β. Scops guatemalæ*, SHARPE, Cat. Striges Brit. Mus. 1875, 112, pl. ix.

ε. cassini.

Scops brasilianus, *ε. cassini*, RIDGW., MS.

The above synonymy will serve to show what names I would bring together under the specific head of *Scops brasilianus* (Gmel.) on account

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of the complete intergradation of the forms which they designate; it will also indicate the number and names of the more pronounced races I have been able to make out, arranged in chronological sequence, the full synonymy of each being given separately further on.

There are now before me 44 specimens of Scops-owls from Tropical America, different specifically from *S. barbarus*, *S. flammeolus*, and *S. nudipes*, and also very distinct from the hairy-toed members of the genus. This series appears, at first sight, to be made up of several distinct species, there being no less than six very pronounced types of coloration represented; these different styles being so exceedingly different in appearance that in the absence of intermediate specimens no one would hesitate to recognize their specific distinctness.

These different styles are more or less characteristic of separate geographical areas; thus, the "*brasilianus*" type prevails over Eastern South America, "*ustus*" in Upper Amazonia and in Columbia, "*guatemalæ*" in Central America, and "*cassini*" in Eastern Mexico. They thus partake somewhat of the nature of geographical races; were they strictly such, the case would be very much simplified; but such, unfortunately, is not the case, since it frequently occurs that extreme specimens of one form may be found in a region of which it is not typical, while several, if not all, of them may be represented in a sufficiently extensive series from a single district! Thus, we have true "*guatemalæ*" from Bahia, Brazil; pure *brasilianus* from Costa Rica and Guatemala; and a specimen apparently very much like "*ustus*" from Sta. Catarina, S. E. Brazil.

In the absence of specimens of neutral or intermediate character, these facts would not be antagonistic to the theory of specific distinctness of the forms named above, but, on the contrary, would be decidedly confirmative, since they would do away with the probability that the variations are purely the result of geographical impress. Generalized specimens, however, or those which are not typical of either one or the other of the several races, constitute a very large proportion of the whole.*

It is in consideration of all these facts that we are led to conclude that the several particular forms we have named above, however distinct they may appear when the most specialized examples are compared, are but "strains" of a single species, tending toward the establishment of permanent geographical races (and in the course of time distinct species), but which, in consequence of the non-extinction of specimens of a generalized nature, have not yet passed the incipient stage.

The variations in this species involve not only differences in the colors themselves, but in the character and distribution of the markings, scarcely two examples being exactly alike. Variations of a purely

*A specimen from Mazatlan, Western Mexico, in the gray phase, is so exactly intermediate between *guatemalæ* and *brasilianus* that it cannot be referred more properly to one than to the other.

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individual nature, however, are best treated under the head of each particular race.

a. brasilianus.

Le Hibou de Brésil, BRISS., Orn. I, 1760, 499 (*Brazil*; = rufous phase, with feathers of lower surface distinctly rufous below the surface, and sharply barred).

Strix brasiliana, GMEL., S. N. I, i, 1788, 289 (ex Briss., *l. c.*).

Scops brasilianus, GRAY, Hand-l. I, 1869, 47 (part).—SCL. & SALV., P. Z. S. 1868, 629 (*Venezuela*); 1870, 782 (*Merida, Venezuela*); 1873, 304 (*E. Peru*); Nom. Neotr. 1873, 117 (part).—SHARPE, Cat. Strig. Brit. Mus. 1875, 108 (*Bahia; Para; Island of Mexiana; Upper Amazons; Cayenne; Trinidad; Caraccas; Antioquia; Columbia*).—FINSCH, P. Z. S. 1870, 557 (*Trinidad**).—BOUC., Cat. Av. 1876, 91.

Ephialites brasiliensis, GRAY, Genera B. I, 1844, 35.

Otus brasiliensis, TEMM. & SCHLEG., Fauna Jap. 1845, 25.

Scops brasiliensis, BONAP., Consp. I, 1850, 46.—KAUP, Contr. Orn. 1852, 112.—SCHLEG., Mus. P.-B. Oti, 1862, 21; Rev. Acc. 1873, 11.

Megascops brasiliensis, KAUP, *t. c.* 228.

Asio brasiliensis, BONAP., Rev. et Mag. de Zool. 1854, 543.

Choliba, AZARA, Apunt. II, 1802–05, 218.

Strix choliba, VIEILL., Nouv. Dict. XVI, 1817, 39 (ex Azara, *l. c.*), (= "*brasilianus*" style, with feathers of lower parts distinctly orange-rufous below surface, etc.).

Ephialites choliba, GRAY, Genera B. I, 1844, 38.—PELZ., Orn. Bras. 1870, 9.

Scops choliba, D'ORB., Voy. Ois. 1835–'44, 132.—TSCHUDI, Fauna Per. 1844, 118.—STRICKL., Orn. Syn. I, 1855, 204.—LAWR., Ann. Lyc. N. Y. VII, 1862, 462 (*New Granada*).—SCL. & SALV., P. Z. S. 1866, 198.

Strix decussata, LICHT., Verz. Doubl. 1823, 59.

Scops decussata, BURM., Th. Bras. II, 1856, 126 (*grayish phase*).

Strix crucigera, SPIX, Av. Bras. I, 1824, 22, pl. 9.

Strix undulata, SPIX, *t. c.* pl. 10.

Ephialites argentina, LICHT., Nom. 1854, 7.—SCHLEG., Mus. P.-B. Oti, 1862, 21.

Scops argentina, GRAY, Handl. I, 1869, 47.

? *Scops lophotes*, LESS., Traité, I, 1831, 107.†—PUCHERAN, Rev. et Mag. de Zool. 1849, 22

* "One specimen, agreeing with Brazilian specimens."

† "Tout le dessus du corps brun foncé, ponctué de roux, mais par points très-ténus, très-rapprochés et très-nombreux. Les dessous du corps roux, flammé de noir, formant une masse brune sur la poitrine; les huppes élargies à la base. Patrie inconnue.

"*Observ.* On doit ajouter à ce sous-genre le HIBOU CHAPERONNÉ, *Strix atricapilla*, Temm., pl. 145, du Brésil, et le HIBOU NOCTULE, *Strix noctula*, Reinw., Temm., pl. 99, de Java et de Sumatra, qui est peut-être l'espèce 25, décrite sous le nom de *Scops de Java*." [Lesson, *l. c.*]

From the description alone, as quoted above, it is absolutely impossible to decide to which of the races of *S. brasilianus* this reference belongs. It is quite as likely to be a synonym of the form we distinguish as *atricapillus*, Temm. (see p. 95). Sclater and Salvin (Ex. Orn VII, 1868, p. 102), who have seen Lesson's type, say that it is "probably only a paler form" of *S. brasilianus*. Another name, usually referred to *S. brasilianus*, but which we are in doubt about, is *Scops portoricensis*, Less. (Traité, I, 1831, 107.—"Scops de Porto Rico"). We have never seen a specimen of this genus from any of the West India islands, but think it quite likely that peculiar races exist there. Of this bird also, Messrs. Sclater and Salvin "have seen the type-specimens, . . . in the Paris Museum, and have been unable to distinguish it from *S. brasilianus*." We quote below Lesson's description in full:—

"D'un gris-roux glacé, strié en long de flammèches roux-brun, plus finement strié en travers; deux huppes élargies et triangulaires sur les côtés de la tête; taille un peu plus forte, et teinte beaucoup plus blonde que l'espèce d'Europe. Habite l'île de Porto-Rico. (Mus. de Paris, Maugé.)"

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(critical).—Bonap., Consp. I, 1850, 46.—Strickl., Orn. Syn. I, 1855, 204.—Scl. & Salv., Ex. Orn. 1868, 102 (in text).—Gray, Hand-l. I, 1869, 47.

Asio lophotes, Bonap., Rev. et Mag. de Zool. 1854, 543.

? *Scops portoricensis*, Less., Traité, I, 1831, 107.—Pucheran, Rev. et Mag. Zool. 1849, 26 (critical).

"*Ephialtes portoricensis*", Léot., Ois. Trinidad, 1866, 57.

Remarks.—This style, which prevails over Eastern South America (Brazil, Paraguay, and Buenos Ayres), is characterized mainly by the very sharp definition of the cross-bars on the lower parts, these being usually nearly pure black upon an almost pure white ground, and by the very distinctly orange-rufous bases of the feathers, this color showing conspicuously on the lower surface wherever the plumage is disarranged.

Thirty specimens are before me, the localities represented being the following:—Brazil (13), Paraguay (1), Buenos Ayres (1), Ecuador (Napo 1), Columbia (Antioquia 2, Bogota 2), Costa Rica (9), and Guatemala (1.) Six specimens from Costa Rica, collected by Mr. J. C. Zeledon, are almost undistinguishable from one another; the uniformity of their characters being indeed remarkable for this species. Two others which greatly resemble each other are one from Bogota, in Salvin and Godman's collection, and one in my own collection (No. 2270) from Guatemala. These are almost exactly alike; they have the upper parts of a dark grayish-brown color, very minutely and densely vermiculated with blackish, further relieved by occasional, inconspicuous lighter frecklings, and rather indistinct blackish mesial streaks, most obvious on the pileum; the feathers of the lower surface are distinctly bright buff below the surface, while the blackish markings—both the transverse and the longitudinal ones—are sharply defined and very distinct. In their general aspect, these specimens agree very nearly with typical examples of the "*brasilianus*" style, but are darker in their general coloring above, where the mottlings are finer and denser.

A typical specimen of the style is No. 16431 (Nat. Mus.), from Paraguay. This has the lower plumage exactly like the two specimens described above, but the upper parts are lighter and more grayish, with the blackish mesial streaks in stronger relief. The Costa Rica specimens alluded to above greatly resemble this one, but are rather paler and more grayish. An extreme example is No. 12400 (Nat. Mus.), from Buenos Ayres. This has the lower parts as described above, except that the orange-buff of the basal portion of the feathers is brighter, and the black mesial streaks broader. The upper parts are light tawny, or sandy clay-color (not rufous), with very minute and inconspicuous transverse vermiculations, the black mesial streaks broad and conspicuous, especially on the pileum, where they form continuous stripes, while on the dorsal region they each have one or two expansions, so as to form a bead-like series. Quite similar to this, but darker above and with narrower streaks beneath, is a male in Salvin and Godman's collection from Antioquia, Columbia.

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The most aberrant of the South American specimens before me is an example from Sta. Catarina, S. E. Brazil (Mus. Salvin and Godman). This has the upper plumage much as in the specimen last described, but the outer webs of the scapulars are bright buff, instead of white, and the pileum is suffused with blackish, the streaks of this color being thus rendered less distinct. It is the lower parts, however, which differ most: there is an entire absence of the usual sharply-defined, transverse, blackish markings, but in their stead exceedingly irregular and ragged markings of rusty rufous, into which the very obvious but ill-defined broad mesial streaks gradually blend; the whole pectoral region, the throat, and the face have a uniform rusty-buff ground-color, relieved by few markings. This individual apparently approaches the form named by Sclater *S. ustus.*

Besides the above variations, there is another, involving the intensity of the buff on the basal portion of the feathers of the lower parts; in many, this is so bright as to show conspicuously wherever the feathers are the least bit disarranged, while in others only the merest trace of it can be discovered by careful search. Between all these variations, however, there is every possible intermediate condition in different individuals.

Mr. Sharpe (*l. c.*) remarks that this race does not assume the bright rufous phase so common in the form named *guatemalæ.* I have seen, however, a specimen from Bahia, an adult female, which is as brightly rufous as any specimen of *guatemalæ*, or, for that matter, even *S. asio.* The upper parts are deep brick-rufous, all the feathers with blackish shaft-streaks, these broadest on the pileum and back; the upper tail-coverts and the sides of the neck only are without these streaks. The outer webs of the exterior row of scapulars are pure white; the feathers of the dorsal region show fulvous transverse spots on the basal portion, mostly concealed, except where the feathers are disturbed, and larger across the nape than elsewhere. Each feather of the sides, flanks, and abdomen has a mesial streak of blackish-brown (with here and there a slight external suffusion of paler and more rusty-brown), which color expands into two rather wide, transverse, externally pointed spots on the basal half of the feather,—the terminal half having two or three narrow, finely zigzag, transverse lines of dark brown, here and there mixed with rufous,—making an average number of four bars on each feather, of which the two anterior are wider and more rufous.

This specimen resembles the rufous phase of "*cassini*" very much more than that of "*guatemalæ*", but is very much larger in all its dimensions.

A young bird, from Costa Rica, in the collection of Messrs. Salvin and Godman, differs from the adult as follows: ground-color light-buff, deepest above, relieved by narrow transverse bars of dusky, equally distinct above and below.

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*List of Specimens Examined.**

Museum No.	Museum.	Sex.	Locality.	Date.	Wing.	Tail.	Culmen.	Tarsus.	Middle toe.
12400	U. S.	♀ r.	Buenos Ayres		6.55	4.00	.58	1.10	.82
16431	U. S.	♀ g.	Paraguay	June, 1859	6.55	4.00	.58	1.20	.90
16430	U. S.	♀ g.	Brazil	Aug., 1850	6.40	4.05	.60	1.20	.85
—	S. & G.	juv. b.	do		7.00	4.30	.65	1.20	.90
—	S. & G.	— br.	do		6.65	4.20	.60	1.30	.....
—	S. & G.	— gr.	Brazil (Bahia)		6.25	4.00	.57	1.20	.85
—	S. & G.	— gr.	do		6.20	.....	.60	1.20	.90
—	S. & G.	— br.	do		6.00	3.80	.55	1.10	.85
—	S. & G.	ad. r.	Brazil (St. Catherine's)		7.90	5.20	.65	1.40	1.00
—	S. & G.	ad. b.	Brazil		6.90	4.40	.....	1.28	.93
—	G. N. L.	ad. g.	do		6.60	4.00	.52	1.20	.85
—	G. N. L.	♂ g.	Brazil (Bahia)		6.25	3.70	.52	1.05	.75
—	G. N. L.	♀ r.	do		6.40	4.00	.52	1.20	.....
50946	U. S.	♀ g.	Southern Brazil		7.50	4.90	.65	1.50	1.00
7205	M. C. Z.	ad. g.	Brazil (Pernambuco)		6.10	3.80	.60	1.15	.85
30966	U. S.	ad. r.	Ecuador (Napo)		6.80	4.30	.....	1.30	.98
—	S. & G.	♂ r.	Columbia (Medellina)		7.00	4.20	.60	1.20	.98
—	S. & G.	♂ r.	do		7.50	4.60	.70	1.28	.98
—	S. & G.	ad. g.	Columbia (Bogota)		7.40	4.30	.60	1.15	1.00
—	G. N. L.	ad. g.	do		7.30	4.50	.55	1.25	.90
2270	R. R.	ad. g.	Guatemala		7.15	4.40	.65	1.20	.95
30416	U. S.	ad. g.	Costa Rica (San José)		7.00	4.10	.58	1.12	.90
67876	U. S.	juv. b.	Costa Rica		.....	.....	.....	.....	.....
67877	U. S.	juv. b.	do		.....	.....	.....	.....	.....

* In these tables, the initials in the column headed Museum stand for the following: "U. S.",=United States National Museum; "S. & G.",=Museum Salvin & Godman; "G. N. L.",=Museum of George N. Lawrence, esq.; "M. C. Z.",=Museum of Comparative Zoology, Cambridge, Mass.; "R. R.",=Museum of R. Ridgway. In the next column, the letters *g*, *r*, and *b* indicate the gray, rufus, and brown (or intermediate) phases respectively. The measurement of the culmen does not include the cere; the tail is measured to the extreme base of the coccyx, and the middle toe to the base of the claw.

β. atricapillus?

? ***Strix atricapilla***, "NATT.", TEMM., Pl. Col. II, 1838, pl. 145.

Scops atricapilla, STEPHENS, Shaw's Gen. Zool. XIII, pt. 2, 1826, p. 51, pl. 39.—CUV., Règ. Anim. ed. 2, 1829, 347.—BONAP., Consp. I, 1850, 46.—KAUP, Contr. Orn. 1852, 112.—STRICKL., Orn. Syn. I, 1855, 202.—BURM., Th. Bras. II, 1856, 128.

Ephialites atricapilla, GRAY, Genera B. I, 1844, 38, pl. 13, fig. 2 (head).—PELZ., Orn. Bras. 1870, 9 (?).

Megascops atricapilla, KAUP, Trans. Zool. Soc. Lond. IV, 1859, 228.

Asio atricapillus, BONAP., Rev. et Mag. de Zool. 1854, 543.

? ***Ephialites watsoni***, CASS., Pr. Acad. Nat. Sci. Phila. IV, Dec. 1848, 123; Journ. Phila. Acad. II, 1852, 95, pl. xii, fig. 1.

Scops watsoni, BONAP., Consp. I, 1850, 46.—GRAY, Hand-l. I, 1869, 47.

Asio watsoni, BONAP., Rev. et Mag. de Zool. 1854, 543.

DIAGNOSIS.—*Adult male, gray phase* (Mus. O. S. & F. D. G., Engento do Gama, Brazil, Aug. 18, 1826; Natterer).—Wing, 6.80; tail, 4.00; culmen, .55; tarsus, 1.15; middle toe, .80. Facial circle, ear-tufts, and pileum sooty-blackish, on the latter broken by minute grayish and faint fulvous mottling, this prevailing on the forehead and eyebrows; outer webs of ear-tufts nearly uniform blackish, but inner webs conspicuously spotted or indented with pale fulvous and whitish. Orbital region dusky—conspicuously so in front of and above the eye—the face growing paler on the cheeks, next the blackish facial ring, where the color is pale grayish,

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indistinctly undulated with darker. Occiput crossed by a quite conspicuous light-colored band, the feathers of which have the basal portion pale fulvous and the terminal portion whitish, with irregular dusky bars. Upper parts in general finely mottled grayish-brown, with indistinct streaks and zigzags of dusky and minute mottlings of very pale ochraceous; outer webs of scapulars whitish, more or less stained with buff. Tail dusky, with about seven bands of pale fulvous, each inclosing a narrower and more irregular dusky band; outer webs of primaries marked with quadrate spots of dusky and pale fulvous, the latter smallest, growing deeper-colored toward the shaft, and having occasional dusky mottlings centrally, the former mottled with fulvous gray along the edges of the feathers. Lower parts uniform pale dull buff, the feathers with narrow, but distinct, dusky, mesial streaks, and with scattered, irregular cross-bars of the same color, the latter averaging about *two* on each feather, and situated near the end; on the breast these markings more numerous and irregular, and the general surface broken by irregular spots of white. Tarsi pale buff, with faint mottlings of rusty-brown on the outer side; under tail-coverts with a single faint spot at the end of each feather.

REMARKS.—The appearance of this owl is peculiar from the dusky coloring of the face, especially around the eyes, the peculiar shade of the pale buff lower parts (which lacks the bright orange tint of other races), the sparseness of the markings below, and in the pinkish tinge of the axillars and under wing-coverts.

While it is all but certain that the specimen described above is the same as *Ephialites watsoni*, Cassin, there is considerable doubt as to its being equivalent to *Strix atricapilla*, Temm. The plate of the latter represents a much smaller bird, with altogether grayer tints above, and pure white, instead of fulvous, beneath. In fact, this plate calls instantly to mind the form described in this paper as *S. cassini* (see page 102), and were it not that the habitat of Temminck's bird is given, on good authority, as Brazil, I should not hesitate to identify it with the latter form. The writer examined some years ago the type-specimens of *Ephialites watsoni*, in the museum of the Philadelphia Academy, and as he recollects them they correspond quite closely, if not entirely, with the specimen described above. Still, they may be somewhat different. The figure given by Cassin in the "Journal" of the Academy (pl. xii, fig. 1) is extremely inaccurate as regards the details of coloration; but it may be observed that the coloring represents almost exactly the peculiar shades which we consider one of the chief characteristics of the present form. The following is the original description of *Ephialites watsoni*, in full:—

"Summit of the head black, with a few very minute pale spots, more numerous on the front and eyebrows. Shorter feathers of the ear-tufts black, others black also, but with their inner webs spotted or mottled with white. A semicircle above the eye, extending to the ear-tufts,

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black; rigid feathers at the base of the bill black, with pale grayish terminations; feathers immediately below the eye gray, mottled and broadly tipped with black.

"Discal feathers grayish white, many of them speckled, and all tipped with black, presenting a white and black semi-collar or ruff on each side of the neck. Plumage of the throat with fine alternate bars of black and nearly white.

"Neck above with a well-defined collar, the feathers composing which are strongly fulvous, terminated with white and speckled with black.

"Back, rump, tail, and wing-coverts mottled and freckled with grayish white, upon a black ground, many of the feathers having about three to five very irregular transverse bands of whitish; on the wing-coverts and back some of the pale marks are almost circular with black centres; others are of irregular form also enclosing centres of black.

"External webs of the primaries black, with subquadrate nearly white bars, nearly all of which have black centres, assuming, also, a more or less well defined square form. Internal webs of primaries with alternate bands of different shades of black.

"Breast and entire inferior parts pale fulvous, every feather conspicuously marked on the shaft longitudinally with black, and with very irregular transverse bands and irregularly mottled with black; the black markings most numerous and most irregular on the breast. Many of the feathers on the breast with very pale, nearly white spots, having somewhat the appearance of being distributed in pairs.

"Tail black, with about seven or eight narrow irregular grayish bands, many of which have central lines of black.

"Tarsi feathered to the toes, pale fulvous white, mottled with black.

"Bill horn color at the base, whitish at the tip.

"Total length (of skin) about 9½ inches, wing 7, tail 3½ inches.

"Younger? Plumage above paler, with small spots and minute freckles of grayish white, scarcely assuming the appearance of bands.

"Breast with the dark markings predominating, and tending to form a broad pectoral band; lower parts of the body bright fulvous, with black marks.

"*Hab.* South America.

"This species bears some resemblance to *Ephialites atricapilla*, (Natt.) Temm. pl. col. 145, but is much larger, and has only one nuchal collar. The general color above is also much darker; the fulvous colouring of the inferior surface of the body is also a striking difference.

"One specimen of this species in the Rivoli collection is labelled 'Orenoque', and another in the collection of the Academy is probably from South America."

The description given in the Journal of the Philadelphia Academy (vol. ii, p. 95) is essentially the same as the above.

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γ. ustus.

Scops usta, Scl., P. Z. S. March 9, 1858, 132 (*Ega, Upper Amazons.*—Mus. Norwich); Trans. Zool. Soc. Lond. IV, 1859, 265, pl. lxi.—Gray, Hand-l. I, 1869, 47.—Bouc., Cat. Av. 1876, 91.—Scl. & Salv., P. Z. S. 1866, 198; Ex. Orn. 102.

Scops brasilianus, subsp. *a. Scops ustus*, Sharpe, Cat. Strig. Brit. Mus. 1875, 111 (*Sarayacu* and *Chamicuros, E. Peru; Venezuela?*).

Habitat.—Upper Amazonia (Ega; Scl., *l. c.*; Chamicuros and Sarayacu, E. Peru, and Venezuela?; Sharpe, *l. c.*).

This form I have never seen, and therefore have to give descriptions at second hand. The original one (Sclater, *l. c.*) is as follows:—

"Supra saturate castaneo-brunnea, plumis omnibus nigro subtilissime vermiculatis; facie et gula pure castaneo-brunneis, hac pallidiore: linea post regionem auricularem, cornuum capitis extantium marginibus latis et pileo supero nigris: alarum pennis pallide castaneo-brunneis nigro punctulatis, intus autem ochracenti-albidis, quinque et sex fasciis latis in pogonio externo, maculas quadratas efficientibus, nigris trans-vittatus; cauda ex eodem colore sed fasciis nigris pæne obsoletis: subtus clarius brunnea, lineis augustis longitudinalibus, scapus plumorum occupantibus, nigris parce notata: tectricibus alarum inferioribus sordide albis: tarsis pallide fulvis: rostro et pedibus flavis.

"Long. tota 8.5, alæ 7.0, caudæ 4.0, tarsi 1.2.

"*Hab.* Ega, on the Upper Amazon (H. W. Bates)."

The above description, and the plate accompanying it, represent a form of *Scops* of which I have never seen typical examples. It seems clearly to belong to *S. brasilianus*, of which it is probably a peculiar "strain"—hardly to be called the rufescent extreme (since the latter is to be found in the bright rufous phase of "*guatemalæ*"), but rather showing a very highly-colored condition, in which the rufous tint is spread rather than intensified, so as to more or less completely obliterate the usual white markings. The case seems to be somewhat parallel to that of *S. kennicotti* as compared with *S. asio*, and is probably more or less closely connected with climatic peculiarities of the district inhabited by the race; for instance, an excessive rain fall and a prevalence of denser and darker forests than generally exist to the eastward.

According to Mr. Sclater (*l. c.*), this form "is distinguishable from every South American member of the genus . . . . . by its rich brown coloring above and below, and by the longitudinal lines below not being crossed as in *S. choliba* and *S. atricapilla*."

Among the numerous specimens of *Scops brasilianus* in the series before me, is one which seems to approach quite nearly to the characters of this race, being devoid of sharply defined black bars below, where, in their place, are extremely irregular ragged zigzags of rusty rufous, the blackish shaft-streaks being unusually broad, and externally suffused with rufous; only the terminal half, or exposed portion, of the abdominal feathers is white, the entire breast, tibiæ, and tarsus having a uniform deep ochraceous ground-color. Among other differences from

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typical *brasilianus* may be mentioned the deep buff or ochraceous outer webs of the scapulars, inner webs of the ear-tufts, and indeed all the markings of the upper surface, which are white in that form; these peculiarities being among the distinguishing features of the *ustus* type. This specimen, however, is from Sta. Catarina, S. E. Brazil. It belongs to the collection of Messrs. Salvin and Godman.

In his description of this form, Mr. Sharpe describes what he terms its "gray phase", but which seems to be decidedly more brown than gray, and, to judge from the description, quite different from anything I have seen. I quote the essential parts of the descriptions of this form given by Mr. Sharpe:—

"*Adult male* (gray phase). General color above dull earthy brown, so finely vermiculated as to appear almost uniform at first glance, a few fulvescent cross markings more conspicuous on the scapulars and secondaries, very slightly indicated on the hind neck, and not forming a distinct collar; crown of head rather blacker than the back, the feathers infinitesimally freckled with sandy rufous, the ear-tufts blackish, scarcely vermiculated at all; . . . . . ear-coverts sandy brown, indistinctly barred across with blackish brown, and narrowly shaft-streaked with white . . . . . ; rest of under surface ochraceous buff, thickly sprinkled with wavy lines and vermiculations of dark brown, especially on the side of the chest, some of the breast feathers streaked with black and barred across with white, the flanks scantily barred with dark brown, inclining to white near the tip, the markings scanty, as also on the under tail-coverts . . . . . Total length 9.5 inches, wing 6.6, tail 3.9, tarsus 1.3.

"*Adult female* (rufous phase). General characteristics as in the gray phase, but rufous where the other bird is brown, and slightly more mottled on the upper surface with rufescent cross bars; below nearly uniform rufous, deeper on the chest, some of the feathers slightly streaked with black, more narrowly on the breast and abdomen; on the chest a few dull brown vermiculations, the abdomen indistinctly barred with fulvous. Total length 9 inches, wing 6.55, tail 3.4, tarsus 1.3.

"*Obs.* The principal characteristics of this race are the uniformity of its upper surface, and the comparative absence of streaks; scapulars fulvescent, not white. These remarks apply both to the brown and rufous phases, neither of which shows any collar on the hind-neck.

"*Hab.* Upper Amazons."

δ. guatemalæ.

"*Scops brasilianus*", Lawr., Ann. Lyc. N. Y. IX, 1868, 132 (*San José, Costa Rica*).—Salvin, P. Z. S. 1870, 216 (*Veragua*).

Scops brasilianus, subsp. *β. Scops guatemalæ*, Sharpe, Cat. Strig. Brit. Mus. 1875, 112, pl. ix, both phases (*Guatemala; Acoyapa, Nicaragua; Costa Rica; Veragua*).

Scops guatemalæ, Bouc., Cat. Av. 1876, 91 (*Central America*).

Remarks.—In Central America, from Veragua to Guatemala, a form prevails which, in the absence of extralimital specimens or of examples

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approximating one of the other styles, I should not hesitate to characterize as a distinct species. This style is "*S. brasilianus*, subsp. *β. Scops guatemalæ*" of Sharpe (*l. c.*), to which probably as many as 90 per cent. of the specimens brought from those countries may be referred. It happens, however, that while absolutely typical specimens of the "*brasilianus*" style *do* occur from both these countries, specimens of typical "*guatemalæ*" also occur in Brazil, thus annulling the importance of geographical considerations; while, as a further proof of specific identity, the number of specimens which cannot be referred to either one or the other of these two forms, but which are in every respect intermediate, is by no means small.

The prominent features of this variety are, a confusedly-mottled, rather than regularly-barred, lower plumage, and a darker upper surface, there being little approach to that sharpness and clearness of all the markings which characterize the other form; the bright orange-buff bases of the feathers of the lower parts, so usual (*but not constant*) in typical specimens of the "*brasilianus*" style, is also absent in all the specimens I have seen. As in the latter variety, the individual variations in "*guatemalæ*" tend to great extremes, both as to the shades of coloration and the pattern of the markings; the principal of these are the following:—

Gray extreme (spec. in Mus. Salvin & Godman, Coban, Vera Paz, Jan. — "O. S. 2352"):—Prevailing color above pale brownish, *very coarsely* mottled with pale buff and grayish-white, and with larger and very irregular spots of blackish, these nowhere assuming the form of shaft-streaks, even on the crown; sides of the forehead or "eyebrows" appreciably, but not abruptly, paler (mottled whitish). Face, throat, sides of neck, and jugulum dirty whitish, finely and quite regularly undulated transversely with brownish, the dusky facial circle not distinct. Rest of lower parts soiled white, the whole surface relieved by *very irregular, ragged, and confused zigzag lines* of dusky brownish, the feathers showing very irregular, but quite distinct, mesial, blackish streaks, with which the transverse markings unite.

The above description is of a specimen representing the extreme grayish phase, so far as shown by the series before me; others, in Messrs. Salvin and Godman's collection, exhibit a gradual transition to the rufous phase, scarcely two specimens being alike in the precise shade of brown, while positively none agree in the details of pattern. Thus, two males from Veragua ("Arcé, 2401", and "Arcé, 1806") have the upper parts so nearly devoid of coarse mottlings as to appear of a nearly uniform light umber-brown. On the other hand, a specimen from Vera Paz ("O. S. 2348") has the general dusky coloring above relieved by very conspicuous, large, and, in places, regularly-oblong, transverse spots of pale fawn-color. In the latter specimen, the white on the outer web of the scapulars is broken by transverse wide bars of mottled fawn and dusky, while in nearly all the others this white is unbroken, having only the terminal blackish border common to nearly all the species of the genus.

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There is also much variation as to the markings of the lower parts; usually, these are very numerous, and extremely ragged and zigzag, consequently appearing much confused; in two specimens, however, one from Choctum, Vera Paz, the other from Bahia, Brazil (Wucherer), the transverse markings are much fewer, wider apart, and more regular, the average interval being, in the latter specimen, as much as .25 of an inch!

The most aberrant specimen in the series is one from Chiriqui ("Arcé, 1873"), which, however, appears, from the texture of its plumage, to be a young bird. In this all the markings are very fine zigzag vermiculations, *there being no longitudinal streaks above or below*, except a few among the feathers of the breast. The shades of colors, however, are identical with those of others in the series.

A specimen of gray plumage from Mazatlan, Mexico (No. 23793, Nat. Mus.; John Xantus), agrees strictly with the Choctum specimen described above in the markings of the lower parts; but the upper parts are grayer, with conspicuous mesial streaks of black, mostly of sagittate form, agreeing exactly in this respect with a specimen of "*brasilianus*" from Pernambuco, Brazil, in the collection of the Museum of Comparative Zoölogy (No. 7805).

The extreme rufous phase is represented in the series by two specimens from Guatemala (belonging to the Boston Society of Natural History). These are bright brick-rufous above, the outer webs of the scapulars pure white, in strong contrast, and the feathers of the pileum with mesial streaks of black,—thus very closely resembling the corresponding phase of *S. asio*. The face, throat, and jugulum are also of a paler, but quite uniform, rufous, relieved by few or no markings of any kind; the rest of the lower parts are white, the feathers with indistinct mesial streaks of dusky brownish and faint and ragged cross-bars of pale rufous. These specimens resemble the extreme rufous phase of "*brasilianus*", as described above, except that there are no distinct blackish streaks on the back, where also the feathers are devoid of the basal fulvous spots, while the bars on the lower surface are much less distinct and regular.

Two other specimens of this phase in the collection of Messes. Salvin and Godman are quite different. One, from Coban, Vera Paz, is a young bird, with remnants of the immature plumage. The new dress however, largely prevails. In this example, the whole dorsal region is varied by an exceedingly faint, yet obvious spotting of a paler rufous, and narrow blackish shaft-streaks, and the lower parts are much more distinctly and regularly barred, the bars being, moreover, of a considerably darker shade. It thus approximates quite closely to the rufous specimen of "*brasilianus*" above referred to. The other specimen is from Las Salinas, Vera Paz ("March, O. S. 2349"), and is still more different. The upper parts are so dark as to be almost chestnut, while the back is distinctly *spotted* with black. The breast is nearly uniform dark

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ferruginous, with distinct and wide blackish shaft-streaks, and broken in the middle portion by whitish bars; the remainder of the lower parts are white, with the transverse bars of *blackish* so broad that the mesial streaks are rendered nearly obsolete.

Regarding the rufous phase of this variety, Mr. Sharpe remarks (*l. c.* p. 114):—

"The rufous phase of *S. guatemalæ* is quite different from anything that I have seen from South America, being entirely of a foxy rufous color, with the head never darker than the back or showing any approach to a blackish patch; the back is generally rather narrowly streaked with black, as is also the head; and there are in some examples slight indications of bars." As stated on p. 94, however, the Brazilian bird does sometimes assume this bright "foxy rufous" phase.

A specimen in the bright rufous phase from Jalapa (S. E. Mexico; D'Oca; Mus. Salvin & Godman) differs from the two Guatemala specimens described above in the paler rufous of the pileum (where the usual black shaft-streaks are almost entirely absent), the paler rufous of the face and throat, the coarser and more ragged markings of the lower surface, and the paler tarsi. In other respects, however, it is identical. Compared with a rufous specimen of *S. cassini*, from the same locality, the differences are much more conspicuous. The latter is more like the corresponding phase of *S. barbarus*, being distinctly variegated above with paler spotting and numerous blackish shaft-streaks, and the *picturæ* of the lower parts more distinct.

List of Specimens Examined.

26 L.	Guatemala	.....	G. N. L ...	— *g.*	6. 80	3. 90	.58	1. 30	.90
— L.	.....do.	.....	....do	— *g.*	6. 55	3. 80	.58	1. 10	.....
2401 Arcé.	Chitra, Veragua	—— —, 1869	S. & G	♂ *g.*	6. 20	3. 60	.55	1. 12	.85
2352 O. S.	Coban, Vera Paz	—— —, 1860	...do	— *g.*	6. 50	4. 00	.52	1. 20	.90
2348 O. S.	Vera Paz, Guatemala.	.....	...do	— *g.*	6. 60	4. 10	.55	1. 15	.85
—	Chootum, Vera Paz ..	Feb —, 1862	...do	— *g.*	6. 60	3. 90	.58	1. 18	.80
1806 Arcé.	Calovevora, Veragua .	—— —, 1868	....do	♂ br.	6. 60	3. 85	.58	1. 15	.85
1873 Arcé.	Chiriqui.....	.....	....do	Juv. gr.	6. 20	3. 50	.60	1. 10	.80
—	Bahia, Brazil	.....	....do	Ad. gr.	6. 50	4. 00	.55	1. 25	.80
2349 O. S.	La Salinas, Vera Pas .	Mar. —, 1860	....do	Ad. red.	6. 50	4. 00	.55	1. 18	.85
—	Coban, Vera Paz	—— —, 1859	...do	Ad. red.	6. 50	3. 90	.....	1. 20	.85
—	Guatemala	.....	Bost. Soc..	Ad. red.	6. 30	3. 80	.58	1. 20	.82
—	.....do..	.....	....do	Ad. red.	6. 48	3. 70	.55	1. 30	.82
23793	Mazatlan, W. Mex ...	.....	U. S	Ad. gr.	6. 00	3. 70	.50	1. 18	.82
—	E. Mexico (Jalapa)...	—— —, 1872	S. & G	Ad. red.	6. 20	3. 60	.55	1. 25	.80
55978	Costa Rica.....	.....	U. S	Ad. gr.	6. 60	3. 90	.....	.....	.....

c. cassini.

"*Scops atricapillus* (NATT.) STEPH.", RIDGW., in B. B. & R. Hist. N. Am. B. III, 1874, 48 (foot-note).

Scops brasilianus, ζ. *cassini*, RIDGW., MS.

Habitat.—Eastern Mexico (Mirador; Jalapa).

DIAGNOSIS.—Wing, 5.80–6.10; tail, 3.20–3.50; culmen, .45–.50; tarsus, 1.20; middle toe, .80.

Gray phase; adult.—Above grayish-brown, finely mottled with lighter and darker shades, the general dusky brownish hue interrupted by two conspicuous lighter bands, one across the nape, and the other across

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the occiput, where the pale brownish buff spots are very large and the darker markings correspondingly reduced in size. Beneath whitish, the feathers with ragged mesial streaks of blackish and transverse vermiculations of the same.

Rufous phase; adult.—Above cinnamon-rufous, with blackish shaft-streaks. Beneath white, with blackish mesial streaks and irregular transverse base of rufous and blackish.

REMARKS.—This very distinct race, which I refer somewhat doubtfully to *S. brasilianus*, so closely resembles *S. maccalli*, both in size and colors, that, were it not for the perfectly naked toes, certain specimens of the two could scarcely be distinguished. From *S. barbarus*, with which it agrees in the nakedness of the toes, it may be readily distinguished by the much stouter feet (both relatively and absolutely), as well as by certain well-marked differences in the coloration. Of the other races of *brasilianus*, it most closely resembles the one we have described under the name of *atricapillus* (see p. 95), having, like that style, a very distinct lighter nuchal collar. It is considerably smaller, however, and presents well-marked differences in coloration, which may be expressed as follows:—

S. ATRICAPILLUS.—Wing, 6.80; tail, 4.00; tarsus, 1.15; middle toe, .80. Ground-color below pale buff; face and crown nearly uniform dusky. *Hab.*, Brazil.

S. CASSINI.—Wing, 5.80–6.10; tail, 3.20–3.50; tarsus, 1.20; middle toe, .80. Ground-color below white; face grayish or brownish white, coarsely barred with dusky; crown coarsely spotted with blackish, pale brown, and grayish-white. *Hab.*, Eastern Mexico.

It will be seen by the above, that while *cassini* has the wing and tail very much shorter than in *atricapillus*, the feet are, on the other hand, actually longer, the two birds thus having quite different proportions, in view of which fact it may ultimately prove advisable to recognize in *S. cassini* a distinct species. Compared with *S. barbarus*, which is sometimes exceedingly similar in plumage, the difference in the feet is still more striking; while the only other form which resembles it—*S. maccalli*—has the toes distinctly bristled, whereas in the present form they are perfectly bare.

27115	U. S	Gr. ad.	Mirador, Mexico		6. 10	3. 50	.50	1. 20	.80
33556	U. S.	Gr. ad. ♀	.....do	Nov. —, 1863	5. 90	3. 40	.45	1. 20	.80
12372	M. C. Z	Ruf. ad.	Jalapa, Mexico	Apr. 9, 1869	5. 80	3. 90	.50	1. 20	.80

3. SCOPS BARBARUS.

"*Scops flammeola*", SALVIN, Ibis, 1861, 355 (*nec* Licht.).

Scops barbarus, SCL. & SALV., P. Z. S. 1868, 57: Ex. Orn. I, 1868, 101, pl. li; Nom. Neotr. 1873, 117 (*Guatemala*).—GRAY, Hand-l. I, 1869, 47.—SHARPE, Cat. Strig. Brit. Mus. 1875, 107 (*Sta. Barbara, Vera Paz, Guatemala*).—BOUC., Cat. Av. 1876, 91.

Habitat.—Guatemala.

DIAGNOSIS.—Wing, 5.25–5.60; tail, 2.90–3.10; culmen, .45; tarsus, 1.00–1.05; middle toe, .70–.75. *Shafts of the auriculars produced into*

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long, slender, hair-like bristles, forming a conspicuous ruff round the face, the anterior side concave. *Gray phase (adult)*:—Above brown, thickly *spotted* with black, the black prevailing on the pileum; outer webs of scapulars white, bordered terminally with black. Beneath whitish, the feathers marked with transverse bars and mesial stripes of black, the white of opposite webs having the form of roundish or oblong spots. *Rufous phase (adult)*:—Above cinnamon-rufous, all the feathers (except upper tail-coverts) with wide and distinct mesial streaks of black. Beneath white, the feathers with shaft-streaks of black and wide cross-bars of rufous having black borders.

REMARKS.—This very distinct species is apparently most nearly related to *S. flammeolus*, with which it agrees in the extreme weakness of the feet. It differs, however, from that form in being of much stouter build, more "fluffy" plumage, the head appearing larger and the body stouter in consequence of the greater length and looseness of the feathers. The plumage also is quite different, the markings being altogether coarser. The differences between the two have been more precisely expressed on a preceding page. From *S. cassini*, which it sometimes very closely resembles in colors, it may be immediately distinguished by its much weaker feet and different proportions, as follows:*—

SCOPS BARBARUS.—Wing, 5.25–5.60; tail, 3.10; tarsus, 1.00–1.05; middle toe, .70–.75. *Hab.*, Highlands of Guatemala.

SCOPS CASSINI.—Wing, 5.80–6.10; tail, 3.20–3.50; tarsus, 1.20; middle toe, .80. *Hab.*, Eastern Mexico (Vera Cruz, etc.).

42776	U. S.	Ad.	Central Guatemala.....	..... (?).....	5. 60	3. 10	.45	1. 00	.75
—	S. & G.	Ad. gr.	Vera Paz, Guatemala....	—— —, 1862	5. 60	3. 10	.45	1. 00	.70. [Type]
—	S. & G.	Ad. r.	Sta. Barbara, Guatemala.	Apr. —, 1860	5. 35	3. 10	.45	1. 00	.70. [Type.]

4. SCOPS FLAMMEOLUS.

"*Strix flammeola*, LICHT., MS., in Mus. Berol., *undè*."

Ephialites flammeola, LICHT., Nom. 1854, 7.

Megascops flammeola, KAUP, Trans. Zool. Soc. Lond. IV, 1859, 226.

Scops flammeola, SCL., P. Z. S. 1858, 96.—SCHLEG., Mus. P.-B. Otl, 1862, 27; Rev. Acc. 1873, 14.—SCL. & SALV., P. Z. S. 1868, 57; Ex. Orn. VII, July, 1868, 99, pl. l.; Nom. Neotr. 1873, 117 (*Mexico; Guatemala*).—GRAY, Hand-l. I, 1870, 47.—ELLIOT, Illustr. Am. B. I, 1869, pl. xxviii.—COUES, Key, 1872, 203; Check List, 1873, 65, No. 319.—RIDGW., in B. B. & R. Hist. N. Am. B. III, 1874, 58, fig. (*Guatemala; Mexico; Sierra Nevada, n. to Ft. Crook, Cal.*, where breeding); Field & Forest, June, 1877, 210 (*Boulder Co., Col.*; March.—"Iris umber-brown"!); Orn. 40th Par. 1877, 335, in text (*Nevada, Cal.?*).—HENSHAW, Orn. Wheeler's Exp. 1874, 135 (30 m. *south of Apache, Ariz.*; Sept. 11).—SHARPE, Cat. Strig. Brit. Mus. 1875, 105 (*Dueñas, Guat.; W. Mexico; Valley of Mexico*).—BOUC., Cat. Av. 1876, 91 (*Mexico*).

Flammulated Owl, COUES, *l. c.*

Feilner's Owl, B. B. & R., *l. c.*

Habitat.—Highlands of Guatemala and Mexico, north to latitude 40° in the Sierra Nevada and Rocky Mountains of the United States.

* SCOPS FLAMMEOLUS.—Wing, 5.10–5.60; tail, 2.60–3.00; tarsus, .90–1.00; middle toe, .60–.68.—*Hab.*, Highlands of Guatemala, Mexico, and Western United States north to about 40°.

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DIAGNOSIS.—Wing, 5.10–5.60; tail, 2.60–3.00; culmen, .35–.40; tarsus, .90–1.00; middle toe, .60–.68. *Adult.*—Above finely-mottled grayish, the feathers with irregular blackish shaft-streaks. *Outer webs of scapulars more or less strongly washed with orange-rufous* on a white ground; outer webs of lower middle wing-coverts white, forming conspicuous spots. Ground-color below white, the feathers with very distinct mesial black streaks, from which proceed narrower transverse lines, mostly toward the end of the feathers. *Juv.*—Above finely-mottled grayish, but the mottlings all transverse and the shaft-streaks wanting; below coarsely and rather dimly barred with dark grayish on a dull whitish ground, and with no longitudinal markings. *Iris umber-brown!* (*fide* Mrs. M. A. Maxwell).

REMARKS.—Specimens vary chiefly in the amount of rufous wash on different parts of the plumage. A wash of this color is usually present on the pileum, while it sometimes spreads over the face, throat, and back; Mr. Sharpe (*l. c.*) even mentions a specimen, from Guatemala, which is entirely orange-rufous above, and strongly pervaded by the same color on the lower surface, especially on the throat, where it forms a large patch. He also mentions "a perfectly gray bird, on which scarcely a tinge of orange coloring remains, either above or below, while the whole appearance of the specimen is dingy, owing to the closeness and frequency of the vermiculations." I have never seen a specimen representing either of these extreme phases, all the specimens before me (seven in number) being of average coloration.

42157	U. S.	Ad.	Orizaba, Mex.	Feb. 3, 1865	5.50	2.80	.40	.90	.65
24172	U. S.	♂ juv.	Fort Crook, N. Cal.	Aug. 23, 1860	5.50	3.00	.35	.92	.60
—	U. S.	Ad.	30 miles S. of Apache, Ariz.	Sept. 11, 1873	5.28	2.73	.....	.....	.....
—	M. A. M.	Ad.	Boulder, Colorado*	.....	5.50	3.10	.35	.95	.60
—	S. & G.	Ad.	Dueñas, Guatemala	Jan. —, 1863	5.50	2.90	.40	1.00	.68
—	S. & G.	Ad.	.....do	—— —, 1863	5.50	2.90	.40	.90	.60
—	S. & G.	Ad.	Valley of Mexico	.....	5.10	2.75	.35	.90	.60

* Iris *umber-brown!*

C.—*Toes partly covered with hair-like, bristly feathers, the terminal scutellæ only completely naked.*

In this group are included only *S. asio*, *S. trichopsis* (?), and *S. cooperi*, all of which belong to the country north of the Isthmus of Panama, there being, so far as known, no South American species with hairy toes. The species of this group may be distinguished as follows:—

S. ASIO.—Bars of the lower surface coarse, and frequently double, especially on the flanks. *Hab.*, Whole of the United States; south to Guatemala; north to Sitka.

S. TRICHOPSIS?—Bars of the lower surface fine, nearer together than in *S. asio*, and more uniformly distributed. General aspect paler, with much finer vermiculations.

S. COOPERI.—Bars of the lower surface in form of dense, fine, zigzag vermiculations.

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The differences between *Scops asio* and the species here called *S. trichopsis* do not, it is true, seem to be very great, according to the characters given above. It is not the *amount* of difference, however, between these two forms which has induced me to recognize them as distinct species, but the *constancy* of the differences pointed out; *S. asio* having in every one of its numerous geographical and local races the bars of the flanks, etc., coarse and frequently double, while all the specimens of *S. trichopsis* which have come under my notice have these bars much finer and denser, with no disposition to be arranged in pairs. Mr. Sharpe also lays stress upon the same differential characters.

5. SCOPS ASIO.

a. asio.

Strix asio [=*rufous phase*], LINN., S. N. I, 1766, 132 (based on *Noctua aurita minor*, Catesb., Carol. I, 73.—*Asio scops carolinensis*, Briss., Orn. I, 497).

Scops nævia [=*gray phase*], GMEL., S. N. I, i, 1788, 289 (based on *Mottled Owl*, Arct. Zool. II, 1785, 231, no. 118, t. xi).

Bubo striatus [=*gray phase*], VIEILL., Ois. Am. Sept. I, 1807, 54, pl. 21.

? "*Ephialites ocreata*, LICHT., in Mus. Berol."

β. maccalli.

Scops McCallii, CASS., Illustr. B. Cal. Tex. &c. July, 1854, 180; in Baird's Birds N. Am. 1858, 52.

Scops asio, var. *enano*, "LAWR., MS.", Ridgw., Bull. Essex Inst. V, Dec. 1873, 200.

γ. kennicotti.

Scops kennicottii, ELLIOT, Pr. Ac. Nat. Sci. Phila. 1867, 69; Illustr. Birds Am. 1869, p. xxvii, pl. ii.

δ. floridanus.

Scops asio, var. *floridanus*, RIDGW., Bull. Essex Inst. V, Dec. 1873, 200.

ε. maxwelliæ.

Scops asio, *ε. maxwelliæ*, RIDGW., Field and Forest, June, 1877, 210, 213.

The chief differential characters of the several geographical races of this widely distributed owl may be expressed as follows:—

Colors smoky-brown or dusky umber, and pale fulvous, with little or none of pure white. Outer webs of scapulars pale fulvous. Never bright rufous.

1. Wing, 6.85–7.60; tail, 3.50–4.50. Apparently not varying to rufous *Hab.*, The Northwest coast, from Oregon to Sitka; Idaho.....*γ. kennicotti.*

Colors much lighter, some shade of ashy-gray or grayish-brown above, pure white beneath. Outer webs of scapulars pure white. Sometimes bright rufous, with white and black markings.

2. Wing, 6.10–7.80; tail, 3.30–4.35. Varying, in the Eastern, *but not in the Western*, Province, to bright rufous. In the rufous phase, white prevailing on the lower surface, where the red markings are not broken into transverse bars. *Hab.*, Whole of the United States, except the high western mountains, and the Gulf coast.....*a. asio.*

3. Wing, 5.50–6.00; tail, 2.75–3.10. Varying to bright rufous; in the rufous phase, red prevailing on the lower parts, where the markings are much broken into transverse bars. *Hab.*, Florida and S. Georgia.....*δ. floridanus.*

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4. Wing, 5.50–5.90; tail, 2.80–3.50. Varying to bright rufous; gray phase like that of *asio* and *floridanus*, but the mottling above much coarser, and the nape with a strongly indicated collar of rounded white spots, in pairs, on opposite webs. Red phase much more spotted above than that of *asio* or *floridanus*. *Hab.*, E. Mexico and highlands of Guatemala..... *β. maccalli.*

5. Wing, 6.80–6.90; tail, 3.90–4.10. Not varying to rufous. General aspect much paler than any of the preceding; above pale ash-gray, or very pale cinnamon-gray, the white of the outer webs of the lateral scapulars very conspicuous, the white spots of the outer webs of the primaries sometimes confluent. Beneath pure white, much more sparsely marked than in *asio* and other races. *Hab.*, Mountains of Colorado..... *ε. maxwelliæ.*

The characters given above are sufficient to distinguish typical specimens of several well-marked geographical forms of *Scops asio*. It is of course understood that specimens possessing intermediate characters frequently occur; but it is equally true that a very large majority of the specimens from either one of the regions indicated above are typical of the form characteristic of the locality.

a. asio.

The Little Owl, CATESBY, Carolina, I, 1731–'48, 7, pl. 7.

Noctua aurita minor, CATESB., *l. c.*

Asio scops carolinensis, BRISS., Orn. I, 1760, 497.

Le Petit Duc de la Caroline, BRISS., *l. c.*

Strix asio, LINN., S. N. I, 1766, 132 (based on *Noctua aurita minor*, Catesby, Carol. I, 7.—*Asio scops carolinensis*, Briss. I, 497).—GMEL., S. N. I, i, 1788, 287.—LATH., Ind. Orn. I, 1790, 54; Gen. Hist. I, 1821, 314.—DAUD., Tr. Orn. II, 1800, 216.—SHAW, Gen. Zool. VII, 1809, 229.—WILS., Am. Orn. V, 1812, 83, pl. 42, fig. 1.—TEMM., Pl. Col. II, 1838, pl. 80 (gray phase).—BONAP., Ann. Lyc. N.Y. II, 1826, 36; Synop. 1828, 36; Isis, 1832, 1139.—JARD., ed. Wilson, I, 1831, 307.—AUD., Orn. Biog. I, 1832, 486; V, 1839, 392, pl. 97.—NUTT., Man. I, 1832, 120.—BREWER, ed. Wilson, 1852, 687.—HOBS., Nat. 1855, 165.

Scops asio, BONAP., Comp. List, 1838, 6; Consp. I, 1850, 45.—LESS., Traité, I, 1831, 107.—KAUP, Contr. Orn. 1852, 112.—CASS., Illustr. B. Cal. Tex. &c. 1854, 179; in Baird's B. N. Am. 1858, 51.—HEERM., Pacific R. R. Rep. II, 1855, 35.—STRICKL., Orn. Syn. I, 1855, 199.—BREWER, N. Am. Oöl. 1857, 65.—BAIRD, Cat. N. Am. B. 1859, no. 49.—? SCHLEG., Mus. P.-B. Oti, 1862, 27; Rev. Acc. 1873, 9.—GRAY, Hand-l. I, 1869, 46.—COOPER, Orn. Cal. I, 1870, 420.—MAYN., Naturalist's Guide, 1870, 131 (*Mass.*).—COUES, Key, 1872, 202; Check List, 1873, 65, no. 318.—B. B. & R., Hist. N. Am. B. III, 1874, 49.—SHARPE, Cat. Strig. Brit. Mus. 1875, 114 (*Delaware; Toronto*)—RIDGW., Bull. Essex Inst. Oct. 1874, 172 (*Sacramento, Cal.*); Orn. 40th Par. 1877, 336, 389, 518, 571 (*Sacramento* and *Nevada, Cal.*).—D'HAMONDV., Ois. Eur. 1876, — (*Europe*).—BOUC., Cat. Av. 1876, 91.

Bubo asio, VIEILL., Ois. Am. Sept. I, 1807, 53, pl. 21.—AUD., Synop. 1839, 29; Birds Am. I, 1840, 147, pl. 40.—DEKAY, Zool. N. Y. 1844, pl. 12, figs. 25, 26.—GIRAUD, Birds L. I. 1844, 28.—MAX., J. f. O. 1858, 23.

Otus asio, STEPHENS, Shaw's Gen. Zool. XIII, ii, 1826, 57.—SCHLEG., Fauna Japon. 1845, 25.

Asio asio, LESS., Man. Orn. I, 1827, 117.

Ephialites asio, GRAY, Genera B. I, 1844, 38; List B. Brit. Mus. 1844, 96.—WOODH., Sitgreaves's Exp. 1853, 62.

Megascops asio, KAUP, Trans. Zool. Soc. Lond. IV, 1859, 228.

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Strix asio, capite aurito, corpore ferrugineo, the little screech owl, BARTRAM, Travels, 1791, 289.

Red Owl, PENN., Arct. Zool. II, 1785, 231, pl. xi, fig. 1.

Mottled Owl, PENN., *t. c.* pl. xi, fig. 2.

Strix nævia, GMEL., S. N. I, i, 1788, 289.—LATH., Ind. Orn. I, 1790, 55; Gen. Hist. I, 1821, 321.—DAUD., Tr. Orn. II, 1800, 217.—SHAW, Gen. Zool. VII, 1809, 230.—WILS., Am. Orn. III, 1812, 16, pl. 19, fig. 1.

Asio nævia, LESS., Man. Orn. I, 1827, 117.—BONAP., Rev. et Mag. de Zool. 1854, 543.

Otus nævius, CUV., Règ. Anim. ed. 2, 1829, 241.

Surnia nævia, JAMES., ed. Wils. I, 1831, 96, 99.

Bubo striatus, VIEILL., Ois. Am. Sept. I, 1807, 54, pl. 21.

"*Ephialites ocreata*, LICHT., in Mus. Berol."

"*Scops asio* var. *macoalli*", HENSHAW, Orn. Wheeler's Exp. 1874, 135 (*Gila R., Camp Grant*, and *San Pedro, Arizona*); *ib.* 4to Rep. 1875,405 (*Arizona* and *New Mexico*).

Without repeating here a detailed description of the plumages of this form, for which the reader is referred to the "History of North American Birds" (vol. iii, pp. 49–51), a few remarks concerning local and geographical variations may suffice. The most noteworthy point in this connection is the apparently established fact that while this bird very frequently varies to bright lateritious-rufous in the Eastern Province of the United States (this erythrismal phase even very largely predominating in some localities*), it seems *never* to assume this plumage in the Western States and Territories. At the same time, there seems to be no difference whatever in specimens of the gray phase from the Atlantic States and California, as well as other of the Western States and Territories, if we except those districts inhabited by different races (*i. e.*, *kennicotti*, *maxwelliæ*, etc.). There are now before me the following specimens representing the adult of this phase, belonging to my own collection: a pair from Nicasio, California, a male from Sacramento, a male from Arizona (San Pedro River), a female from Southern Illinois, a male from the District of Columbia, and another from Virginia. Of these, the two California specimens and the examples from Illinois and Virginia are so precisely similar that were their labels taken off or interchanged it would not be possible to distinguish them by colors and markings. The Arizona example differs solely in being of a purer ash-gray shade, the others being of a more brownish-gray; the Sacramento specimen is similar to those from Nicasio, only lighter-colored, being a midsummer specimen, in faded plumage, while the others were killed in October, and consequently in possession of the new fall dress. The skin from the District of Columbia differs from the others in having a very decided cinnamon cast to the plumage, thereby exhibiting a ten-

* Whether the relative number of specimens of the two phases in a given locality has anything to do with geographical or climatic considerations, I have not the material to enable me to determine. Certain it is, however, that while in the States bordering the Atlantic the gray phase is generally quite as common as the other, it is so extremely rare in the Lower Wabash Valley that I have seen there but two individuals in the course of many years' observation, the red specimens constituting fully 95 per cent. of all. This has also been the experience of others whom I have questioned regarding the matter.

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dency toward the rufous phase; all the markings, however, are as in the grayish birds. The measurements of these specimens are as follows:—

—	R. R.	♂ ad.	Nicasio, Marin County, Cal.	Mar. 2, 1877	6.30	3.50	.....	.....
—	R. R.	♀ ad.	.....do	Mar. 2, 1877	6.60	3.65	.....	.....
152	R. R.	♂ ad.	Sacramento, Cal.	June 21, 1867	6.70	3.60	.....	.....
2.49	R. R.	♂ ad.	San Pedro River, Arizona	Oct. 4, 1873	6.60	3.70	.....	.....
—	R. R.	♀ ad.	Mount Carmel, S. Ill.	Oct. 7, 1876	6.40	3.50	.....	.....
—	R. R.	♂ ad.	Fairfax County, Virginia	Nov. 4, 1876	6.50	3.70	.....	.....
—	R. R.	♂ ad.	District of Columbia	Dec. 7, 1874	6.35	3.25	.....	.....

Three specimens in the rufous phase, also in my collection, measure as follows:—

953	R. R.	♂ ad.	Mount Carmel, Ill.	May 1, 1869	5.90	3.20	.....	.....
954	R. R.	♂ ad.	..... do	July 30, 1870	6.00	3.00	.....	.....
2606	R. R.	♀ ad.	District of Columbia	Nov. 8, 1860	6.50	3.60	.....	.....

The first of these specimens inclines very decidedly, both in measurements and plumage, to var. *floridanus;* and, in view of the fact that typical specimens of *Ortyx virginianus floridanus*, *Tinnunculus sparverius isabellinus*, and other Southern forms occur in the same locality, may be perhaps best referred to that form.

β. maccalli.

Scops McCallii, CASS., Illustr. B. Cal. Tex. &c. July, 1854, 180 (*Texas; Northern Mexico*); in Baird's B. N. Am. 1858, 52; ib. ed. 1860, pl. xxxix (part).—BAIRD, Mex. Bound. Survey. II, pt. iv, Birds, 1859, pl. 1; Cat. N. Am. B. 1858, no. 50.—STRICKL., Orn. Syn. I, 1855, 200.—SCL. & SALV., Ibis, 1859, 220.—GRAY, Hand-l. I, 1869, 47.

"*Scops trichopsis*", GRAY, Hand-l. I, 1869, 47 (Sharpe).—SCL. & SALV., Nom. 1873, 117 (*Mexico; Guatemala*).

Scops asio var. *enano*, "LAWR.", RIDGW., Bull. Essex Inst. V, Dec. 1873, 200 (*E. Mexico; Guatemala*); in B. B. & R., Hist. N. Am. B. III, 1874, 48 (do.).

Scops enano, BOUC., Cat. Av. 1876, 91 (*Mexico*).

Scops asio, subsp. γ. *Scops enano*, SHARPE, Cat. Strig. Brit. Mus. 1875, 118 (*Mexico; W. Mexico*).

Habitat.—Eastern and Northern Mexico; Guatemala; Texas (*Cassin*).

DIAGNOSIS.—Wing, 5.60–5.90; tail, 3.10–3.50; culmen, .45–.50; tarsus, 1.00–1.15; middle toe, .70–.75. *Gray phase* (*adult*).—Similar to the gray adult of *S. cassini*, but toes bristled, the occipital collar nearly obsolete, and the nuchal collar less distinct. *Red phase* (*adult*).*—Above dull rusty, much broken across the nape by a collar of pale ochraceous spots, the whole surface elsewhere being also more or less mottled with paler rusty than the ground-color, and relieved by ragged mesial streaks of black. Lower parts pale rufous, each feather crossed near the end by a wide white bar, and with two to three narrow, somewhat irregular lines of blackish.

Young.†—Above brownish-gray, transversely mottled with darker and paler, and *without dusky shaft-streaks.* Below grayish-white, with

* Dueñas, Guatemala. In Mus. Salvin & Godman.

† Coban, Vera Paz. In Mus. Salvin & Godman.

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badly-defined bars of pale grayish-brown, the feathers somewhat ochraceous beneath the surface. Wings and tail as in the adult.

REMARKS.—The gray phase of this form is exceedingly similar in general appearance to that of *S. cassini*, not only above but also on the lower surface. The upper parts are more coarsely mottled, however, and the pale bands across the lower part of the nape and occiput are less conspicuous, especially the latter. The rufous phase is more like that of *S. barbarus*, the upper parts in particular being quite similar. On the lower parts, however, there is more rufous, while the black cross-lines are more distinct as well as more numerous. The species may be distinguished from all the other Mexican and Tropical American species (except from *S. cooperi*, from Costa Rica) by the distinctly bristled toes. In the latter feature, it agrees with *S. asio* of the United States, but is considerably smaller, while the red phase is very different from the corresponding plumage of that species. It is also smaller, unless compared with the small race bird distinguished as var. *floridanus*, which differs in colors and markings, as explained in the remarks respecting that form on page 113.

The *Scops McCallii* of Cassin seems to be the present form rather than what has been so called by most subsequent writers (*i. e.*, true *asio* and *S. trichopsis ?*), the description corresponding exactly, while the habitat is nearly the same—*i. e.*, Texas and "Northern Mexico".

S. McCallii is described as follows:—

"In form and general appearance like the preceding, (*S. asio*), but *much smaller;* short and robust; wing with the fourth quill longest; tail short, slightly curved inwards; tarsi rather long, fully covered; toes partially covered with long hair-like feathers. ADULT. *Male.*—Much resembling in color the adult of the species immediately preceding, [*i. e., S. asio,*] *but darker;* entire plumage above ashy brown, nearly every feather with a longitudinal stripe of brownish black, and with numerous irregular transverse lines and points of the same; under parts, ashy white, every feather with a longitudinal stripe of brownish black, and with well-defined *but irregular* transverse lines of the same; flanks and sides tinged with pale fulvous; quills brown, with several transverse bands of pale reddish-white, assuming the form of quadrangular spots on the outer webs, and pale reddish ashy on the inner webs; tail ashy brown, with about ten narrow transverse bands on all except the two central feathers, well-defined on the inner webs; scapular feathers and some of the greater coverts of the wings, edged with white; bill greenish horn-color, light yellowish at the tip; irides yellow.

"DIMENSIONS. Total length, 7½ to 8 inches; wing, 6; tail, 3 inches. *Male.*

"HAB. Texas (Mr. Schott); Northern Mexico (Lieut. Couch). Spec. in Mus. Acad. Philada., and Nat. Mus., Washington City.

"OBS. This species very considerably resembles the adult or gray plumage of the *Scops asio*, but is uniformly *much smaller and darker*

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in color. The transverse lines on the under surface of the body are better defined and more numerous."

In the above description, those characters which fit "*enano*", and not "*trichopsis*", I have taken the liberty to italicize.

In the "Birds of North America" (p. 53), a rufous specimen is described, which renders it still more certain that Cassin's *Scops McCallii* is the form which we have hitherto called "*enano*". The specimen there mentioned as in the National Museum from Florida is not this form, but has since been made the type of *S. asio* var. *floridanus.**

—	Boston Soc..	Gray ad.	Guatemala.....	.....(?).....	5.60	3.30	.55	1.05	.70
—	S. & G.....	Gray ad.	San Bernardo, Guatemala.	Oct. —, 1862	5.70	3.10	.50	1.15	.75
—	....do	Gray ad. ♂.	V. de Fuego, Guatemala.	Jan. —, 1874	5.90	3.35	.50	1.12	.35
—	....do	Ruf. ad.	Dueñas, Guatemala.....	—— —, 1861	5.85	3.50	.50	1.05	.72
—	....do	Gray juv.	Coban, Vera Paz.....	.....(?).....	5.60	3.25	.45	1.00	.70
—	G. N. L	Gray ad.	Mexico	.....(?).....	.....	.....	....	.....	....

γ. *kennicottii.*

? *Scops asio*, COOP. & SUCKL., Pacific R. R. Rep. XII, ii, 1860, 155 (*Washington Terr.*).—LORD, Naturalist in Vancouver I., II, 1866, 292.

Scops kennicottii, ELLIOT, Pr. Ac. Nat. Sci. Phila. 1867, 69; Illustr. Birds Am. 1869, p. xxvii, pl. 11 (*Sitka, Alaska*; March, 1866).—DALL & BANNIST., Tr. Chicago Acad. I, ii, 1869, 273 (do.).—BAIRD, *id.* 311, pl. xxvii (do.).—GRAY, Hand-l. I, 1869, 47, no. 492.—FINSCH, Abh. Nat. Brem. III, 1872, 28 (*Alaska*).—BOUC., Cat. Av. 1876, 91.

Scops asio var. *kennicotti*, RIDGW. in Coues' Key, 1872, 203.—COUES, Check List, 1873, 65, no. 318 *a*.—B. B. & R., Hist. N. Am. B., III, 1874, 48, 53 ("*from Columbia River northward; Idaho*").

Scops asio, b. *kennicottii*, COUES, Birds N. W. 1874, 303.

Scops asio, subsp. *a. Scops kennicotti*, SHARPE, Cat. Strig. Brit. Mus. 1875, 117 (*Vancouver I.*; "*w. side Rocky Mts.*").

Kennicott's Owl, AUCT., *l. c.*

Habitat.—The Northwest coast district, from Oregon to Sitka; Idaho; Vancouver Island (*Sharpe*); British Columbia (*Sharpe*).

DIAGNOSIS.—*Adult* (♂, 59,847, Sitka, Alaska, March, 1866; Ferd. Bischoff. Elliot's type):—Above umber-brown, with a slightly reddish cast; feathers confusedly mottled transversely with dusky, and showing rounded spots of rufous, most conspicuous on the nape; each feather with a conspicuous mesial, broad, ragged stripe of black, these stripes most conspicuous on the forehead and scapulars; outer webs of scapulars light rufous, bordered terminally with black. Wings of a more grayish cast than the back, but similarly variegated; lower feathers of the middle and secondary wing-coverts each with a large, oval, pale rufous spot, covering most of the lower web. Secondaries crossed by six narrow, obscure bands of pale rufous; primaries with seven, somewhat rounded, quadrate spots of the same on the outer webs, forming

* Since the above was put in type, I have seen, through the courtesy of Dr. E. Coues, a series of this species collected in Southern Texas (by Mr. G. B. Sennett), and consequently the true *S. macalli*. They agree exactly with typical "*S. enano*", which fact therefore settles the question of the proper name of this form.

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as many transverse series; each light spot with a central dusky mottling. Tail more finely and confusedly mottled than the wings; the bands, though present, so indistinct as to be scarcely traceable, and so irregular or badly defined as to be of uncertain number. Ear-tufts black and rusty, the former along the shafts, and in transverse spots; on the outer webs the black predominating, on the inner, the rusty.

Lores and basal half of the frontal bristles white, the terminal half abruptly black; eyebrows about equally blackish and paler, the former bordering the feathers; eye surrounded by dark snuff-brown; cheeks and ear-coverts pale rusty, transversely barred with deeper rusty; facial circle not well defined, black. Chin and lores only white.

Ground-color of the lower parts dilute-rusty, becoming white on the flanks; each feather of the throat, jugulum, breast, sides, and flanks with a broad mesial stripe of black, this throwing off very narrow, rather distant, bars to the edge; the spaces between these bars alternately paler and deeper dilute-rusty; the black marks broadest on the sides of the breast, where they have an external deep rusty suffusion; the abdomen medially and the anal region scarcely maculate rusty-white; the lower tail-coverts each with a central, cuneate, longitudinal stripe of black. Tibiæ, tarsi, and lining of the wing plain deep rusty. Wing-formula, $3 = 4, 5-2, 6-1 = 9$. Wing, 7.40; tail, 4.00; culmen, .65; tarsus, 1.50; middle toe, .80.

No. 59,068 (Idaho; Dr. Whitehead), is considerably darker than the type, the ground-color above approaching snuff-brown; it differs, however, in no other respect as regards coloration; the size (as might be expected) is considerably smaller, measurements being as follows: Wing, 6.80; tail, 3.50; culmen, .60; tarsus, 1.20; middle toe, .80. Wing-formula the same as in type.

No. 4,530 (Washington Territory; Dr. Geo. Suckley) is just intermediate, in all respects, between typical *kennicotti* and *asio*, being referable to either with equal propriety, though perhaps inclining rather more to the former.

A very obvious character of this race is the smaller size, more quadrate form, and more rufous color, of the spots on the primaries, and the greater indistinctness of the bands on the tail; but this is merely in consequence of the greater extension of the brown markings, thus necessarily contracting the lighter spots. In these respects only, does the Washington Territory specimen differ from the two typical examples before me, having the larger, more whitish spots on the primaries, and more distinct bands on the tail, as in *asio*.

There is a wonderfully close resemblance in general aspect between this form of *Scops asio* and *S. semitorques* (Schleg.) of Japan, caused by the exceeding similarity in size, form, and coloration, both as regards tints and pattern. Indeed, the only very obvious difference consists in the distinctly white jugulum and well-defined lighter occipital and nuchal collars of *semitorques*, which has also the pencillings of the

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lower surface narrower or more delicate. The differences between the two may be tabulated as follows:—

S. SEMITORQUES.*—A well-defined nuchal collar, of mottled pale ochraceous; jugulum immaculate white centrally. Feathers of the lower parts with their transverse pencillings growing fainter toward the middle line, which is unvariegated white from the central jugular spot to the anal region. Wing, 6.60–7.25; tail, 3.60–3.85; culmen, .60; tarsus, 1.25–1.40; middle toe, .80–.90. *Hab.*, Japan.

S. KENNICOTTI.—No well-defined nuchal band; jugulum closely barred centrally; feathers of the lower parts with their transverse pencillings not growing fainter toward the middle line, which is unvariegated white only on the abdominal portion; the medial black streaks to the feathers of the lower surface much broader, and transverse pencillings rather coarser. Wing, 6.90–7.30; tail, 3.50–4.50; culmen, .60–.65; tarsus, 1.35–1.45; middle toe, .80–.90. *Hab.*, North Pacific coast of North America from Sitka to Washington Territory, and Western Idaho.

δ. floridanus.

"*Scops asio*", ALLEN, Bull. M. C. Z. II, 1871, 338.

Scops asio var. *floridanus*, RIDGW., Bull. Essex Inst. V, Dec. 1873, 200 (*Indian R., Florida*); in B. B. & R., Hist. N. Am. B. III, 1874, 48, 51.

Scops asio, subsp. β. *Scops floridanus*, SHARPE, Cat. Strig. Brit. Mus. 1875, 118.

Scops floridanus, BOUC., Cat. Av. 1876, 91.

Habitat.—Florida and Lower Georgia.

DIAGNOSIS.—Similar to var. *asio*, but much smaller, and the colors deeper. The gray stage very similar to that of var. *asio*, but the red phase very appreciably different, there being a greater amount of rufous on the lower parts, the breast nearly uniformly colored, and the rufous broken elsewhere into transverse broad bars, connected along the shaft. Wing, 5.50–6.00; tail, 2.75–3.10.

This extreme Southern form is much smaller than the more Northern ones, being about the same in size as *S. maccalli* of Guatemala and Eastern Mexico, and *S. cassini*, also from the latter country. The colors are also darker and richer.

In the collection of the National Museum are two specimens of this race, one in each phase of plumage. The red one (No. 5,857, Indian River) measures, wing, 5.50; tail, 2.70; culmen, .55; tarsus, 1.05; middle toe, .65. The colors are much darker than those of Northern and Western specimens; the rufous of the neck, all round, shows indistinct, darker, transverse bars; the black border to the white scapular spots is restricted to the tip of the feathers; the inner webs of the ear-tuft feathers are scarcely paler than the outer; the neck and face are deeper rufous, while on the lower parts this color predominates, and is disposed chiefly in transverse rays; and the tibiæ and tarsi are plain rufous. Only the middle of the abdomen and the anal region are pure white.

* *Otus semitorques*, SCHLEG., Fauna Japon. Aves, 1845, 25, pl. 8.

Scops semitorques, BONAP., Consp. I, 1850, 46.—SHARPE, Cat. Strig. Brit. Mus. 1875, 83.

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c. maxwelliæ.

"*Scops asio*", RIDGW., Bull. Essex Inst. Nov. 1873, 185 (*Colorado*).
Scops asio, c. maxwelliæ, RIDGW., Field and Forest, June, 1877, 210, 213 (*Boulder Co., Colorado;* resident; breeding).
Mrs. Maxwell's Owl, RIDGW., *l. c.*

Habitat.—Mountains of Colorado (Boulder Co.; resident and breeding; *Mrs. Maxwell*).

DIAGNOSIS.—Ground-color above pale gray or grayish-brown, relieved by the usual ragged mesial streaks of black, and irregular mottlings and vermiculations of lighter and darker shades. The ground-color, however, never inclining strongly to reddish, and not darker in shade than a very light ash-gray or brown. The white spots on outer webs of the primaries *frequently confluent*, the darker spots, in extreme cases, being hardly visible on the basal portion of the quills when the wing is closed. Face grayish-white, with faint vermiculations of darker grayish. *No rusty gular collar*, but in its stead sparse, narrow bars of brown or rusty on a white ground. Wing, 6.80–6.90; tail, 3.90–4.10; culmen, .60; tarsus, 1.45–1.50; middle toe, .80–.85.

The characteristics of this form are remarkably constant, a series of a dozen or more specimens affording no instance of notable variation.

6. SCOPS TRICHOPSIS?

?*Scops trichopsis*, WAGL., Isis, 1832, 276 (*Mexico*).—BONAP., Consp. I, 1850, 46.—STRICKL., Orn. Syn. I, 1855, 201.—SALVIN, Ibis, 1874, 314.—BOUC., Cat. Av. 1876, 91 (*Mexico*).
Ephialites trichopsis, GRAY, Genera B. I, 1844, 38.
Megascops trichopsis, KAUP, Trans. Zool. Soc. Lond. IV, 1862, 227.
Asio trichopsis, BONAP., Rev. et Mag. de Zool. 1854, 543.
Scops asio, subsp. *δ. Scops trichopsis*, SHARPE, Cat. Strig. Brit. Mus. 1874, 119 (*W. Mexico*).
"*Ephialites choliba*", LAWR., Ann. Lyc. N. Y. VI, 1853, 4 (*nec* Vieill.).
Scops asio var. *maccalli*, COUES, Key, 1872, 203; Check List, 1873, 65, no. 318 *b*.—RIDGW., in B. B. & R. III, 1874, 49, 52.

Habitat.—Western Mexico, and the extreme southwestern portion of the United States (Texas; *Cassin.* New Mexico; *Nat. Mus.* Stockton, Cal.; *Mus. G. N. Lawrence.*)

DIAGNOSIS.—*Adult* (No. 9,147, New Mexico, Feb. 10, 1854; Kennerly and Möllhausen):—Above light ash-gray, minutely vermiculated with dusky and grayish-white, each feather with a distinct mesial stripe of blackish, showing in strong relief; these stripes broadest on the forehead. Outer webs of the exterior row of scapulars white, without black terminal borders; outer webs of two or three lower, middle, and greater wing-coverts also white; outer webs of primaries marked with transverse series of white spots, these forming about eight bands across the larger quills. Tail crossed by about eight narrow, pale bands. Ear-coverts, cheeks, throat, and jugulum finely and uniformly barred transversely, or vermiculated, with dusky and grayish-white; the facial circle interrupted across the throat, where, in its place, is a series of

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longitudinal, black dashes. Lower parts grayish-white, with numerous, very narrow, transverse bars of dusky, each feather with a mesial stripe of black, these stripes forming on the breast conspicuous spots; tibiæ and tarsi dull soiled-white, spotted with dark brown; crissum immaculate white. Wing, 6.50; tail, 3.30; culmen, .55; tarsus, 1.15; middle toe, .70.

Young, in down, but nearly full-grown (No. 16,932, Cape St. Lucas, Lower California; J. Xantus):—Remiges and rectrices as in the adult. Rest of the plumage, above and below, including the head, narrowly barred with dusky and grayish-white, the former predominating above, the latter prevailing below; eyebrows and lores white; wing-coverts finely mottled transversely with dusky and white, the latter forming spots on the lower feathers; tibiæ and tarsi with numerous dusky bars.

REMARKS.—An adult from Stockton, California (E. S. Holden), kindly loaned me by Mr. Geo. N. Lawrence, and the only United States example, besides the one described above, that I have seen, differs from the specimen from New Mexico in having the general tint of the plumage rather more brownish, and the mesial blackish streaks of the upper parts less distinct. It measures, wing, 6.20; tail, 3.10.

The form of Scops-owl represented by the specimens described above, as well as by those from which Mr. Sharpe's descriptions are drawn, is certainly to be distinguished from the several styles of *S. asio* treated in the foregoing pages; but whether it is a distinct species, or merely another geographical race of *asio*, cannot be decided without additional material. For the present, however, I keep it separate, on account of the different pattern of the markings on the lower plumage, which in *S. asio* is exactly the same in all the several races.

There is also considerable doubt as to the name this form should bear. Wagler (*l. c.*) describes an owl from Mexico which may be this bird, but the only pertinent character which I am able to glean from his description is that the toes are bristled; it is, therefore, either this bird or one of the forms of *asio;* but in identifying the *Scops trichopsis* of Wagler with the bird under consideration, I merely adopt the determination of that name as made by Messrs. Sclater and Salvin, and, subsequently, by Mr. Sharpe.

That this is the bird which Mr. Sharpe describes as *Scops asio*, "subsp. *δ. Scops trichopsis*" (*l. c.*), there can be no doubt, his description fitting perfectly the example described above, while his additional remarks on pp. 120, 121, show that he fully appreciated the character of the differences between it and true *asio*. We transcribe Mr. Sharpe's remarks:—

"*Obs.* This is a small race of *S. kennicotti* [*qu. lapsus calam.* for *asio?*]; but, as far as can be determined, it has only a grey phase and no brown one. Its measurements distinguish it at once; and it may also be told by its narrowly barred under surface, every feather being streaked with black, and barred with the same, from the chin to the

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lower abdomen and flanks. It is larger than *Scops enano* [*i. e., maccalli*], and differs from that bird also in not having a rufous phase; the cross-barring of the under surface in the latter is of the same character in *S. enano* as in *S. asio;* that is to say, the bars are often double, whereas in *S. trichopsis* they are single and very distinct."

The specimens in the British Museum, two in number, are both from Western Mexico; and it would seem that the species is mainly confined to the Pacific slope of that country, though ranging sparingly into the Southwestern United States, where, however, true *S. asio* is much more common.

7. SCOPS COOPERI.

Scops cooperi, RIDGWAY, MS.

Habitat.—Costa Rica.

SP. CH.—Very similar to the grayish style of *S. brasilianus*, but with he toes very distinctly bristled.

♀ *ad.* (No. 74,207, Santa Ana, Costa Rica, Sept. 4, 1875, José C. Zeledon):—Above grayish umber-brown, very finely vermiculated with dusky, the feathers of the pileum and back having mesial, chain-like streaks of blackish; outer webs of exterior scapulars somewhat varied with white spotting; outer webs of primaries marked with quadrate spots of pale fulvous, bordered with blackish, there being about ten of these spots on the longest quill (the fifth); tail crossed with narrow bands of the same color, likewise bordered with a narrower dusky bar, these light bands about 10–12 in number. Face brownish-white, finely but distinctly barred with dusky brown; superciliary region lighter and more coarsely mottled; face bordered laterally or posteriorly by a distinct narrow band of dusky spots. Lower parts white, densely marked with blackish and umber-brown zigzags, imparting a light brownish appearance to the whole surface; feathers of the tibiæ and tarsi light rusty-umber, thickly barred with deeper brown. "Iris lemon-yellow; cere, bill and feet, yellowish green." Wing, 7.00; tail, 3.75; culmen, .62; tarsus, 1.25; middle toe, 1.00.

♀ *juv.* (No. 74,552, San José, Costa Rica, May 10, 1866; José C. Zeledon):—*Toes distinctly bristled*, excepting on the two or three terminal scutellæ. General color above light grayish-brown, relieved by very minute and rather indistinct, transverse vermiculations of dusky, and larger, but still inconspicuous, transverse marks of white, these larger and more obvious on the lower webs of the middle wing-coverts. Remiges and rectrices pale grayish-brown, minutely vermiculated with dusky, and distinctly banded with pale reddish-fulvous (color of sulphate of manganese). Lower parts dirty-whitish, crossed *everywhere* with transverse vermiculations, or ragged, narrow lines of dusky, strongly suffused with brownish across the jugulum, where the vermiculations are minute and confused; flanks and crissum with the bars broad and distinct, the interspaces nearly pure white, and wider than the mottled-brownish bars. Bill pale horn-color, yellowish at the end; "iris yellow"; claws very

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pale horn-color, darker terminally. Culmen, .60; tarsus, 1.30; middle toe, .88*

REMARKS.—It is very difficult to express, by a mere description, the points of difference in coloration between this new species and the grayish phase of *Scops brasilianus*. Specimens of the latter, collected in Costa Rica, by Mr. Zeledon, are hardly appreciably different at a casual glance. Upon close comparison, however, it may readily be seen that the lower parts of *S. cooperi* are much more densely vermiculated,† the legs much more rufescent and more distinctly barred, the white variegation of the outer scapulars far less conspicuous, and the light bars on the remiges and rectrices narrower and more numerous. Compared with one of these specimens of *S. brasilianus*, having the wing the same length (7.00 inches), it is found that the tail of *S. cooperi* is much shorter, its length being only 3.75 instead of 4.25; this shortness of the tail in the present species causes the legs to appear proportionately longer, the claws reaching considerably beyond the end of the tail, while in *S. brasilianus* they do not reach to within half an inch of the tip. This greater elongation of the legs is not merely apparent, however, the tarsi being absolutely longer and the toes both longer and stouter; the claws in particular are decidedly stronger than in *S. brasilianus*.

It is not necessary, however, to make a minute comparison of markings and proportions in order to distinguish between these two species, the single character of the toes, being strongly bristled in *S. cooperi* and absolutely naked in *S. brasilianus*, being sufficient for the purpose. *S. cooperi* is, moreover, the only bristly-toed member of this genus found south of Guatemala, so there is no need of confounding it with any other species of the same group.

I have named this species, at the request of Mr. Zeledon, the collector of the type-specimens, after Mr. Juan Cooper, of Cartago, Costa Rica, a particular friend of his, to whom he is much indebted for many interesting contributions to his collections.

* Being a very young bird, and the remiges and rectrices but partly developed, measurements of the wing and tail would of course be of no value.

† Not more so, however, than in some specimens typical of the var. *guatemalæ*, Sharpe.

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NOTES ON THE ORNITHOLOGY OF SOUTHERN TEXAS, BEING A LIST OF BIRDS OBSERVED IN THE VICINITY OF FORT BROWN, TEXAS, FROM FEBRUARY, 1876, TO JUNE, 1878.

By JAMES C. MERRILL, Assistant Surgeon U. S. Army.

The post of Fort Brown, Texas, in the immediate vicinity of which most of the following observations were made, is at the extreme southern point of the State, in latitude 25° 53′ 16″, longitude 97° 13′. It adjoins the town of Brownsville, on the left bank of the Rio Grande, and across the river is Matamoras, in the Mexican State of Tamaulipas. The nearest part of the Gulf coast is about eighteen miles distant. The surrounding country is level, and mostly covered with low chaparral; towards the coast this becomes more sparse, and gives place to extensive prairies, broken by shallow, brackish lagoons and sand ridges, with a scanty growth of cactus and yucca. The average annual temperature is about 73° Fahrenheit; snow and ice are unknown, and slight frosts are rare. But little rain falls from March to September. This region offers an excellent field for the ornithologist. Besides a very large number of northern migrants that either remain throughout the winter or pass farther south, there are many forms characteristic of the river valley, and other Mexican species, either regular summer visitors or stragglers that are new to the United States fauna. A number of the latter class were obtained within our limits for the first time,* and others by Mr. G. B. Sennett; but there are doubtless many more yet to be found.†

Of the localities mentioned in this list, Brazos and Padre Islands are the parts of the Gulf coast nearest the fort; they are long, narrow sand ridges, almost destitute of vegetation. A similar formation is seen in the outer beach on the south shore of Long Island. Santa Maria and Edinburgh (now Hidalgo) are on the river, about twenty-eight and sixty miles respectively above the fort by road. Here the character of the country changes; the trees are much higher, and near the last-named settlement the land begins to rise. The avifauna, too, is somewhat different, and three species‡ in particular stop abruptly there. As a matter of local interest, an asterisk is prefixed to those species that are known to breed within the limits of the fort and government reservation.

* *Thryothorus ludovicianus* var. *berlandieri*, *Vireosylvia flavoviridis*, *Cyanospiza versicolor*, *Myiarchus erythrocercus* var. *cooperi*, *Amazilia fuscicaudata*, *A. yucatanensis*, *Nyctidromus albicollis*, *Sturnella magna* var. *mexicana*, *Molothrus æneus*, *Buteo albicaudatus*, *Parra gymnostoma*, and *Podiceps dominicus*.

† Several species of Parrots are found about Vittoria, ninety miles south of Fort Brown, some of which must occasionally cross the Rio Grande. During the summer of 1877, two specimens of a Trogon were killed north of the river, one near Ringgold Barracks, the second at Las Cuevas, some miles lower down. They were described to me by the persons who shot them, but unfortunately they were not preserved. [Undoubtedly *T. ambiguus*, Gould.—R. R.]

‡ *Campylorhynchus brunneicapillus*, *Auriparus flaviceps*, and *Callipepla squamata*.

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I desire to express my indebtedness to Dr. T. M. Brewer and Mr. R. Ridgway for their assistance in many ways, and for their notes, which add so much to the value of the present paper.

1. **Turdus fuscescens**, Stephens.

January 1, 1877.

2. **Turdus migratorius**, Linn.

Occurs rather sparingly during the winter months.—(DRESSER, Ibis, 1865, 475.)

3. ***Harporhynchus rufus** *var.* **longirostris**, (Lafr.)

This fine songster is a common resident, frequenting shady thickets and rarely seen in the open. In habits, it scarcely differs from the Eastern var. *rufus*, and the large number of nests found here were quite as well built as those found in New England. The usual number of eggs is three, often two, more rarely four: the ground-color varies from greenish to reddish-white, more or less thickly sprinkled with reddish and brownish dots and spots. One set is sparingly covered with large clouded blotches, giving the eggs an appearance unusual in this genus. Fifty-two eggs average 1.08 by .82, the extremes being 1.13 by .86 and .97 by .75. In some adult specimens, there is a decided tendency to whitish tips to the outer tail-feathers, as in var. *rufus*.—(*H. rufus longirostris*, SENNETT, B. Rio Grande, 3.)

4. ***Harporhynchus curvirostris**, (Swains.)

This Thrush is about as common as the preceding species, and is resident. They are not often seen together, however, as this bird prefers more open and sunny localities, especially sparse chaparral, where the prickly pear grows. Here it passes much of its time on the ground, running rapidly about in search of small land-shells and insects. I cannot confirm the praises of the song of this bird given by Couch and Heermann: it seems to me to be one of the most silent of the song Thrushes. Its alarm note is a sharp *whit-whit*. The nests are usually placed among the fleshy joints of the prickly pear, or in some of the many thorny and almost impenetrable bushes found in Southern Texas: they are often seen in the dense prickly hedges that surround most Mexican *jacals*. They are, as a rule, readily distinguishable from those of the Texas Thrasher and Mocking-bird by the almost invariable lining of yellow straws, giving a peculiar appearance to the nest. They are also more compactly built, are well cupped, and often have the edges well guarded by thorny twigs. The eggs are usually four in number: the ground-color is a deep greenish-blue (more rarely pale yellowish), rather sparsely sprinkled over the entire surface with very fine brown dots. They average 1.13 × .80: extremes 1.18 × .83 and .94 × .72.—(DRESSER, Ibis, 1865, 482.—SENNETT, B. Rio Grande, 4.)

5. ***Mimus polyglottus**, (Linn.)

A very common resident. By the 20th of May, many pairs have eggs

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of the second brood.—(DRESSER, Ibis, 1865, 481.—SENNETT, B. Rio Grande, 3.)

6. Galeoscoptes carolinensis, (Linn.)

A few seen during the migrations: some pass the winter here.

7. Sialia sialis, (Linn.)

Uncommon. Two pairs, seen at Edinburgh in May, 1876, were undoubtedly breeding.—(DRESSER, Ibis, 1865, 475.—SENNETT, B. Rio Grande, 6.)

8. Regulus calendula, (Linn.)

Found in some abundance from November to March.—(DRESSER, Ibis, 1865, 476.)

9. Polioptila cærulea, (Linn.)

Abundant during the migrations, a few passing the winter and a considerable number remaining to breed. A nest taken April 24, 1877, was placed on a dead lichen-covered branch of an ebony-bush about six feet from the ground. It was supported by three upright twigs, and was so well concealed that I did not notice it till the female flew off, though I had been standing with my head within a foot of it. It contained five eggs that would have hatched within a few days.—(DRESSER, Ibis, 1865, 485.—SENNETT, B. Rio Grande, 6.)

10. * Lophophanes atricristatus, Cassin.

A common resident. The usual notes of the species are like those of the Eastern Chickadee: it has, in addition, a loud whistling song, much like that of the Cardinal. A nest found near Edinburgh, April 26, 1876, was in a decayed branch, about fifteen feet from the ground, and contained six nearly fledged young: the males had well-developed crests. The nest proper was composed of various soft materials like that of *Parus atricapillus*. About four weeks later, the same pair were making preparations for a second brood in an old *Picus scalaris* excavation just above my tent, but I was obliged to leave before any eggs were laid. A nest found about the middle of May of the following year was, I am confident, of this species. It was in a vertical hole in a stump, enabling the five eggs to be plainly seen: these seemed somewhat larger than eggs of *P. atricapillus*, but otherwise were similar. As the parents were not seen, I left, intending to return in a short time, but was prevented from doing so for several days, when the eggs had been destroyed by some animal. Another nest, found April 18, 1878, was placed in a deep crack in the trunk of a tree: it contained several young.—(DRESSER, Ibis, 1865, 485.—SENNETT, B. Rio Grande, 6.)

NOTE.—An unidentified egg from Matamoras, but not distinguishable from one identified by Mr. Sennett as of this species, measures .62 by .48, is of an oval shape, has a white ground finely sprinkled over with purplish-brown dots. These are more abundant about the larger end, and form a ring around the latter. Fine, indistinct shell-markings give a purplish cast to the ground, which is, however, of a pure white.—T. M. B.

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11. Auriparus flaviceps, (Sund.)

I have not observed this species in the immediate vicinity of Fort Brown, but it was rather common at Edinburgh in April and May, frequenting mostly amargosa chaparral. Several of its curious nests were found placed on horizontal branches of ebony and amargosa bushes about five feet from the ground. The outside was composed of thorny twigs well interlaced: the inside was warmly lined with fur and feathers. The entrance was at one side, barely large enough to admit the bird, and somewhat projecting, giving the entire nest an oval shape. The birds were excessively shy, and were obtained with difficulty.—(SENNETT, B. Rio Grande, 6.)

12. *Thryothorus ludovicianus *var.* berlandieri, Couch.

A rather common resident, and found in all situations. Its song and habits are probably not different from those of the Great Carolina Wren. Although several pairs breed each year within the fort, I did not succeed in finding their nests, which I think were placed in some thick brush piles and fences. At least two broods are raised, and the scarcely fledged young show the characteristic rufous of the under parts. A set of four eggs of this variety now before me, taken near Edinburgh in an old Woodpecker's excavation, average .73 × .54. In three, the ground-color is white with a reddish tinge, thickly dotted with reddish and pale lilac, especially at the larger end. The fourth has the ground-color a warm reddish, like many eggs of the House Wren. A young brood frequented a pile of brush near camp at Edinburgh: they were very tame, coming into my tent and examining its contents with the greatest interest, not minding my presence in the least. The notes are loud and varied, but I am not able to say how much they may differ from those of var. *ludovicianus*.—(*T. ludovicianus berlandieri*, SENNETT, B. Rio Grande, 8.)

13. *Thryomanes bewicki *var.* leucogaster, Baird.

Thryothorus bewicki, SCL., P. Z. S. 1859, 372 (Oaxaca); Catal. 1861, 22, No. 141 (part).—SCL. & SALV., Nom. Neotr. 1873, 7, No. 11 (Mexico).—COUES & SENNETT, Bull. U. S. Geol. and Geog. Survey Terr. vol. iv, No. 1, Feb. 1878, 9 (Brownsville and Hidalgo, Texas).*

Thryothorus bewicki var. *leucogaster*, BAIRD, Review, 1864 127 (San Antonio and Ringgold Barracks, Texas; Sta. Rosalia, Tamaulipas, and New Leon, Mexico).

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* Mr. Sennett's specimens having been compared with the extensive series, embracing the several races of this species, in the National Museum collection, prove to be the var. *leucogaster* of Baird, and not the true *bewicki*. The National Museum possesses two specimens of the latter from Waller County and Brazos, Texas, but none from the Rio Grande, where probably only the var. *leucogaster* occurs, while it also probably does not penetrate farther into the State. The two specimens of true *bewicki* alluded to above were captured December 13 and 14, 1876, and were perhaps merely winter visitors. They are absolutely typical of the race, and, when compared with Mr. Sennett's specimens, the great difference in coloring is at once apparent.—R. R.

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A common resident about Fort Brown, but fifty or sixty miles higher up the river it becomes less abundant. Few birds have a greater variety of notes than this species, and I have frequently been led by a strange song through dense chaparral only to find this little bird perched upon the topmost twig of an amargosa bush apparently enjoying my disappointment. Their principal song is much like that of the Song Sparrow, but sweeter. It probably raises three broods, as I have seen it leading fully fledged young as early as March 27. Its nests are placed in a variety of situations. I have found them in an old Woodpecker's nest, placed between three or four joints of the prickly pear, forming a bulky structure, and among the twigs of various dense thorny bushes. A set of six eggs, now before me, average .68 × .50. I have no eggs of var. *bewickii* at hand with which to compare them. A second set of five, taken on the 2d of May from a nest among the joints of a cactus, are smaller than the preceding, averaging .62 × .50; the markings are much fainter and finer, and the two sets are quite different in appearance. Three other sets taken subsequently vary greatly in size and markings. In some, the latter are very fine and inconspicuous; in others, there are heavy markings of reddish and lilac. Thirty eggs average .63 by .45, the extremes being .70 by .52 and .60 by .46.

NOTE.—The eggs of *T. leucogaster*, as compared with those of *bewicki* and *spilurus*, exhibit many points in common, and do not vary more than the eggs of the same species are often found to differ. Nine eggs of the Texan form, *leucogaster*, are, in size, a trifle the largest, and all of them are much more deeply marked with larger and more confluent blotches of reddish-brown. In size, six eggs of *bewicki*, from Mount Carmel, Ill., collected by Mr. Ridgway, are not quite equal to *leucogaster* and a little less strongly marked, the spots being nowhere confluent. Five eggs of *spilurus* from California are still less in size, and their markings are smaller, fewer, and of a lighter color, one being of an almost immaculate white.—T. M. B.

14. Troglodytes aëdon, Vieill.

Rather uncommon during the winter months.

15. Troglodytes aëdon *var.* parkmanni, Aud.

A single specimen of this variety was taken in the autumn of 1877.

16. Telmatodytes palustris, (Wils.)

One obtained December 16, 1876.

17. Anthus ludovicianus, (Gmel.)

Very abundant from October to March. I have seen a few as late as April 28.—(DRESSER, Ibis, 1865, 476.)

18. Mniotilta varia, (Linn.)

Common during the migrations; a good many pass the winter.—(DRESSER, Ibis, 1865, 476.)

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19. Helminthophaga chrysoptera, (Linn.)

Several specimens taken in the spring.—(DRESSER, Ibis, 1865, 478.)

20. Helminthophaga pinus, (Linn.)

One specimen taken at Edinburgh (Hidalgo) in May.

21. Helminthophaga ruficapilla, (Wils.)

A male obtained in April approaches the supposed "var. *ocularis*" in the restriction of the yellow of throat.—(DRESSER, Ibis, 1865, 478.—SENNETT, B. Rio Grande, 12.)

22. Helminthophaga celata, (Say.)

Rather common during the colder months.—(DRESSER, Ibis, 1865, 478.—SENNETT, B. Rio Grande, 12.)

23. Helminthophaga peregrina, (Wils.)

Less common than the preceding.

24. Parula americana, (Linn.)

Occurs during the migrations.—(DRESSER, Ibis, 1865, 476.—SENNETT, B. Rio Grande, 11.)

25. Parula nigrilora, Coues.

Arrives about the third week in March, and passes the summer among thick woods and near the edges of lagoons where there is Spanish moss. Here they are quite common, and their song is constantly heard. A nest found July 5, 1877, was in a small bunch of the moss about eight feet from the ground: with the exception of four or five horse-hairs, there was no lining. It contained three young.—(COUES & SENNETT, Bull. U. S. Geol. Surv. Terr. vol. iv, Feb. 5, 1878, 11.)

26. Dendroeca æstiva, (Gmel.)

Not uncommon during the migrations.—(DRESSER, Ibis, 1865, 478.)

27. Dendroeca coronata, (Linn.)

This is perhaps the most common of the winter residents, and is found in the greatest abundance from the latter part of October to April. About the latter part of March, there is an arrival of males from the south in nearly full breeding plumage.—(DRESSER, Ibis, 1865, 478.—SENNETT, B. Rio Grande, 13.)

28. Dendroeca maculosa, (Gmel.)

Rather rare in the spring.—(DRESSER, Ibis, 1865, 478.)

29. Dendroeca blackburniæ, (Gmel.)

A female taken May 3 at Edinburgh.—(DRESSER, Ibis, 1865, 478.)

30. Dendroeca dominica *var.* **albilora,** Ridg.

One of the first migrants to return in the autumn, when it is not rare.

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A few pass the winter.—(*D. superciliosa*, DRESSER, Ibis, 1865, 478.—*D. dominica albilora*, SENNETT, B. Rio Grande, 13.)

31. Dendrœca pennsylvanica, (Linn.)

Several seen in April and May.

32. Dendrœca striata, (Forst.)

A single specimen taken in August.

33. Dendrœca castanea, (Wils.)

Not rare in the spring migration.—(DRESSER, Ibis, 1865, 478.)

34. Dendrœca virens, (Gmel.)

Taken in May and November.—(DRESSER, Ibis, 1865, 477.—SENNETT, B. Rio Grande, 13.)

35. Siurus nævius, (Bodd.)

Rather common in the spring and fall.—(*S. noveboracensis*, DRESSER, Ibis, 1865, 477.)

36. Siurus motacilla, (Vieill.)

March 31, 1877.—(SENNETT, B. Rio Grande, 13.)

37. *Geothlypis trichas, (Linn.)

Found throughout the year. Summer birds approach var. *melanops*, and are perhaps referable to that variety.—(DRESSER, Ibis, 1865, 476.)

38. Geothlypis philadelphia, (Wils.)

A female taken within the fort on September 7, 1877.—(DRESSER, Ibis, 1865, 476.)

39. *Icteria virens, (Linn.)

A common summer resident, arriving at Fort Brown about March 26. Here it is much more common than higher up the river. Individuals breeding in Southern Texas are decidedly smaller than those taken in New England, bearing about the same relation to them that *Icterus* var. *affinis* does to var. *spurius*. Thirty-three eggs average .87 × .64.—(SENNETT, B. Rio Grande, 13.)

40. Myiodioctes mitratus, (Gmel.)

Several specimens taken in April, 1876.—(DRESSER, Ibis, 1865, 478.)

41. Myiodioctes pusillus, (Wils.)

Abundant during the migrations, returning in autumn about the 10th of August.—(DRESSER, Ibis, 1865, 478.)

42. Myiodioctes canadensis, (Linn.)

May 2, 1877.—(DRESSER, Ibis, 1865, 478.)

43. Setophaga ruticilla, (Linn.)

Not rare in spring and fall.—(DRESSER, Ibis, 1865, 479.—SENNETT, B. Rio Grande, 14.)

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44. Progne subis, (Linn.)

Occurs during the migrations. I have seen them as early as January 20.—(*P. purpurea*, DRESSER, Ibis, 1865, 479.)

45. Petrochelidon lunifrons, (Say.)

Very common from early in April until the latter part of August. It is one of the most abundant of the summer visitors, and is the only Swallow that breeds here. I have not been able to detect *P. swainsoni*, Scl., of Mexico.—(SENNETT, B. Rio Grande, 15.—*Hirundo l.*, DRESSER, Ibis, 1865, 479.)

46. Hirundo erythrogaster *var.* **horreorum,** Barton.

The latest Swallow to arrive in the spring and the earliest to return in the autumn; first seen about April 12, or earlier, and August 9.—(*H. horreorum*, DRESSER, Ibis, 1865, 479.—SENNETT, B. Rio Grande, 15.)

47. Tachycineta bicolor, (Vieill.)

Common during the migrations. Some of this species must pass the winter at no great distance from here, as I have frequently seen small flocks in November, December, and January, after a few warm days.—(SENNETT, B. Rio Grande, 15.)

48. Cotyle riparia, (Linn.)

Not rare during the migrations. One of the latest Swallows to return in the autumn.—(DRESSER, Ibis, 1865, 479.)

49. Vireosylvia olivacea, (Linn.)

May.—(*Vireo o.*, DRESSER, Ibis, 1865, 480.—SENNETT, B. Rio Grande, 16.)

50. Vireosylvia flavoviridis, Cassin.

Vireosylvia flavoviridis, CASSIN, Pr. Phila. Acad. V, Feb. 1851, 152; VI, pl. ii (Panama).—SCL., P. Z. S. 1856, 298 (Cordova); 1859, 375 (Oaxaca; April); Catal. 1862, 44, No. 264 (Guatemala).—SCL. & SALV., Ibis, I, 1859, 12 (Guatemala); Nom. Neotr. 1873, 11, No. 3 (Mexico to Panama).—BAIRD, Review, May, 1866, 336 (Monterey, Mazatlan, and Rosario, near Colima, Mexico; San José, Costa Rica; Isth. Panama).—SUMICHRAST, Mem. Boston Soc. I, 1869, 547 (Orizaba; Alpine Reg.).—BOUCARD, Cat. 1876, 215, No. 6665 ("N. America").

Vireo flavoviridis, BAIRD, B. N. Am. 1858, 332.

Phyllomanes flavoviridis, CABAN., Journ. 1861, 93 (Costa Rica).

A single specimen, a male, taken within the fort, August 23, 1877.

51. Vireosylvia gilva, (Vieill.)

October 2, 1877.—(*Vireo gilvus*, DRESSER, Ibis, 1865, 480.)

52. Lanivireo solitarius, (Wils.)

August 23, 1877.—(*Vireo s.*, DRESSER, Ibis, 1865, 481.)

53. *Vireo noveboracensis, (Gmel.)

A common resident, breeding abundantly.—(DRESSER, Ibis, 1865, 481.—SENNETT, B. Rio Grande, 16.)

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54. Vireo belli, Aud.

A single specimen taken.—(DRESSER, Ibis, 1865, 481.—SENNETT, B. Rio Grande, 16.)

55. Ampelis cedrorum, (Vieill.)

Seen in small flocks during the migrations; doubtless pass the winter here.—(DRESSER, Ibis, 1865, 480.—SENNETT, B. Rio Grande, 16.)

56. Collurio ludovicianus *var.* **excubitoroides,** (Swains.)

Abundant from about the first of September until April. I do not think that any remain to breed.—(*C. ludovicianus excubitorides*, SENNETT, B. Rio Grande, 16.—*Collyrio ludovicianus*, DRESSER, Ibis, 1865, 480.)

57. *Pyranga æstiva, (Gmel.)

Not rare during the migrations; a few remain here all summer.—(DRESSER, Ibis, 1865, 479.—SENNETT, B. Rio Grande, 14.)

58. Chrysomitris tristis, (Linn.)

Not rare during the winter months.—(DRESSER, Ibis, 1865, 479.)

59. Passerculus savanna *var.* **alaudinus,** Bon.

February.—(*P. alaudinus*, DRESSER, Ibis, 1865, 487.)

60. Pooecetes gramineus *var.* **confinis,** Baird.

Spring and autumn.—(*P. gramineus*, DRESSER, Ibis, 1865, 487.—*P. gramineus confinis*, SENNETT, B. Rio Grande, 17.)

61. Coturniculus passerinus, (Wils.)

January.—(DRESSER, Ibis, 1865, 487.)

62. Chondestes grammica, (Say.)

This species is most abundant during the migrations in April and September; but a few pass the winter, and some remain to breed. In this vicinity, they appear to build indifferently on the ground or in bushes. When in the latter situation, the nest externally is rather bulky, but is neatly finished inside with hairs and rootlets.—(DRESSER, Ibis, 1865, 488.—SENNETT, B. Rio Grande, 19.)

63. Zonotrichia leucophrys, (Forst.)

Abundant during the colder months.—(SENNETT, B. Rio Grande, 19.)

64. Zonotrichia intermedia, Ridg.

This variety seems to be about as common during winter as the preceding.—(*Z. gambeli*, DRESSER, Ibis, 1865, 488.)

65. Zonotrichia albicollis, (Bon.)

On May 11, 1877, I heard the unmistakable song of this species within the fort.

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66. *Amphispiza bilineata, (Cass.)

Much more common in summer than winter. The nests are placed in low, thick bushes, rarely more than two feet from the ground. The eggs, when fresh, have a decided bluish tinge.—(SENNETT, B. Rio Grande, 18.—*Poospiza b.*, DRESSER, Ibis, 1865, 488.)

67. Spizella socialis, (Wils.)

April.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 19.)

68. Spizella pallida, (Swains.)

Very abundant during the winter months, but I do not think that any remain to breed.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 19.)

69. Melospiza melodia, (Wils.)

February and December.

70. Melospiza lincolni, (Aud.)

Very common in winter.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 18.)

71. Peucæa arizonæ, Ridgw.*

Found in some abundance on a salt prairie about nine miles from Fort Brown, but obtained with difficulty, as they could rarely be flushed from among the tall grass. Its notes were frequently heard, and are quite pleasing. A nest found June 16, 1877, was placed among the roots of a tussock of grass: it was made of blades and stems of grasses, and was rather deep, but so frail that it fell to pieces on removal. The eggs, four in number, were quite fresh. They are unspotted white, strongly tinged with greenish-blue, and measure .82 by .63.

* The great variation in size and color between the set of eggs of *P. arizonæ* and those of *P. æstivalis* appears to me to be inconsistent with their belonging to birds of the same species. In North American Birds, I speak of the color of *æstivalis* as being a pure, almost brilliant, white, and their size .74 by .60. This is probably a little smaller than the average. An egg taken by Dr. Bryant in Florida measures .76 by .61. Three eggs, taken by Dr. Gerhardt in Northern Georgia, measure .80 by .62, .78 by .61, and .72 by .60. Their color is crystalline white, similar in brilliancy to the eggs of a Woodpecker. On the other hand, the four eggs of *P. arizonæ* measure .85 by .64, .83 by .64, .82 by .65, .80 by .62, averaging .82½ by .63¾, the average of *æstivalis* being .77 by .61. The eggs of *P. cassini* have the same crystalline whiteness as those of *æstivalis*, while those of *P. carpalis* correspond in color with those of *arizonæ*, and average .73 by .58. The color of the eggs of *P. arizonæ* is of a very light blue, with just a tinge of green, but to some eyes it appears to be a greenish-white.—T. M. B.

[Without specimens of this form in good plumage, it is quite impossible to determine the question of its relationship to *P. æstivalis* by the skins alone. All the specimens I have seen are, unfortunately, in the greatly worn and faded midsummer plumage, and, though resembling examples of *P. æstivalis* in corresponding dress, are easily distinguishable. Considering the latter fact, in connection with the radical difference in their eggs, as insisted on by Dr. Brewer, I think, upon the whole, that the bird may yet prove to be a distinct species.—R. R.]

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72. Peucæa cassini, (Woodh.)

Arrives about the middle of March, its sweet song attracting attention at once. Found in rather open chaparral, but usually keeping in thick bushes, where alone it permits a near approach. It usually sings while hidden in some bush, and, I think, rarely utters its notes on the wing unless the female is sitting. Its nest is difficult to find; three, taken April 28, and May 4 and 22, 1877, respectively, were placed at the foot of small bushes and scarcely raised from the ground. They were composed of dried grasses, lined with finer ones and a few hairs, but were very frail. Thirteen eggs taken from these nests are pure white, and average .74 by .57. Feet and legs are peculiarly light yellowish-white; bill pale horn-color, darker above; iris light hazel.—(DRESSER, Ibis, 1865, 489.—SENNETT, B. Rio Grande, 18.)

73. Embernagra rufivirgata, Lawr.

A common resident, frequenting thickets and brush-fences, and permitting a close approach. The only note I have heard, besides a *chip* of alarm, is a repeated *chip chip-chip*, begun slowly, but rapidly increasing till the notes run into each other. I have found the nests with eggs at intervals from May 9 to September 7. These are placed in low bushes, rarely more than three feet from the ground: the nests are rather large, composed of twigs and straws, and lined with finer straws and hairs; they are practically domed, the nests being placed rather obliquely, and the part above the entrance being somewhat built out. The eggs are from two to four in number: thirty-two average .88 by .65, the extremes being .97 by .67 and .81 by .61; they are pure white. Two, and probably three, broods are raised in a season.—(SENNETT, B. Rio Grande, 22.)

74. Calamospiza bicolor, (Towns.)

Rather common during the winter months.—(DRESSER, Ibis, 1865, 490.)

75. Euspiza americana, (Gmel.)

Common during the spring migration of 1877.—(DRESSER, Ibis, 1865, 490.—SENNETT, B. Rio Grande, 19.)

76. *Guiraca cærulea, (Linn.)

A rather common summer visitor, four or five pairs having nests in patches of tall weeds on the reservation.—(DRESSER, Ibis, 1865, 491.—*Goniaphea c.*, SENNETT, B. Rio Grande, 19.)

77. Cyanospiza cyanea, (Linn.)

Not rare in April and May.

78. Cyanospiza versicolor, (Bonap.)

First taken April 23, 1877. This beautiful species seems to be rather abundant in this vicinity, frequenting mesquite chaparral. Its song has some resemblance to that of the Indigo-bird, and is constantly uttered. I did not succeed in finding any nests.

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79. Cyanospiza ciris, (Linn.)

A not uncommon summer visitor.—(DRESSER, Ibis, 1865, 491.—SENNETT, B. Rio Grande, 20.)

80. *Spermophila moreleti, (Puch.)

This curious little Sparrow is not uncommon during the summer months, and I am inclined to think that a few may pass the winter. During the breeding season the male has a very sprightly song, much resembling that of the Indigo-bird, but sweeter; this it frequently utters while perched on the topmost twig of a bush. They are usually seen in patches of briers and low bushes, at no great distance from water; they are very tame, and will permit a person to approach very closely. At least two pairs built within Fort Brown during the season of 1877. One of these nests, found nearly finished early in May, was in a bush about three feet from the ground: it was not pensile, but was placed on a small branch between three or four upright twigs, and was entirely composed of a peculiar yellow rootlet: it was destroyed by a violent storm before eggs were deposited. A second nest, found May 25, in a young ebony-bush, four feet from the ground, was deserted immediately after completion. It is a delicate little nest, supported at the rim and beneath by twigs, and built of a very fine, dried grass, with which a few horse-hairs, a leaf or two, and a small rag are interwoven: it is 1.70 wide by 1.50 in depth. Both these nests are open and transparent. It is worthy of remark that none of the males seen or killed here were in the typical adult plumage, but in that described by Mr. Lawrence as *S. albogularis*.

The stomachs of the specimens killed were filled with small seeds.

A third nest, found May 5, 1878, was attached to a hanging rim about four feet from the ground. The nest was partly pensile, and was built of delicate rootlets. It contained three young.

81. Pyrrhuloxia sinuata, Bon.

Of this species I cannot say much. At times abundant, particularly in the spring, it often escaped observation for months; and though it probably breeds here, I was unable to find any nests. The birds are usually seen in thickets and about brush-fences, and females are more frequently seen than males.—(DRESSER, Ibis, 1865, 491.—SENNETT, B. Rio Grande, 21.)

82. *Cardinalis virginianus, (Briss.)

A common resident. Some summer specimens approach var. *coccineus* in the almost entire absence of grayish borders to the feathers of the back and rump.—(DRESSER, Ibis, 1865, 491.—SENNETT, B. Rio Grande, 21.)

83. Eremophila alpestris *var.* **chrysolæma**, (Wagl.)

Common during the winter months. I am confident that this species breeds rather plentifully on a prairie within ten miles of Fort Brown.

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Many pairs were seen May 16 and June 2 and 16, 1877, though no nests were found.—(*E. cornuta*, DRESSER, Ibis, 1865, 486.—*E. alpestris chrysolæma*, SENNETT, B. Rio Grande, 9.)

84. Molothrus ater, (Bodd.)

Very common during winter, arriving early in September and leaving in April. The males frequent the stables and picket-lines in large flocks, with three or four other species of Blackbirds: the females are much less common.—(*M. pecoris*, DRESSER, Ibis, 1865, 492.)

85. * Molothrus ater *var.* **obscurus**, (Gmel.)

Common during summer, replacing var. *pecoris* when it leaves. I have found the eggs or young in nests of *Pyrocephalus* var. *mexicanus*, *Vireo noveboracensis*, *Icteria virens*, *Amphispiza bilineata*, *Embernagra rufivirgata*, *Icterus cucullatus*, *I.* var. *affinis*, and *Agelæus phœniceus*.* Fifteen eggs now before me average .78 by .61, which is considerably larger than the measurements given by Dr. Brewer.†—(*M. ater obscurus*, SENNETT, B. Rio Grande, 22.)

86. * Molothrus æneus, (Wagl.)—**The Red-eyed Cowbird.**

a. æneus.

Psarocolius æneus, WAGL., Isis, 1829, 758.—BONAP., Consp. I, 1850, 426.

Molothrus æneus, CABAN., Mus. Hein. I, 1851, 192.—SCL., P. Z. S. 1856, 300; 1859, 365 (Jalapa), 381 (Oaxaca); Catal. 1861, 135, No. 819 (Jalapa).—SCL. & SALV., Ibis, 1860, 34; Nom. Neotr. 1873, 37.—OWEN, Ibis, 1861, 61 (Guatemala; descr. eggs).—CASS., Pr. Ac. Nat. Sci. Phil. 1866, 18 (Mazatlan, Manzanillo, and Jalapa, Mexico; Yucatan; Nicaragua; Costa Rica; Panama).—SUMICHR., Mem. Bost. Soc. I, 1869, 552 (Vera Cruz; hot and temperate regions. Vulg.: "*Tongonito*"; "*Enmantecado*").—SALVIN, P. Z. S. 1870, 191 (Chitra and Calobre, Veragua).—LAWR., Ann. Lyc. N. Y. IX, 1868, 104 (Costa Rica); Mem. Bost. Soc. II, 1874, 281 (Mazatlan, Manzanillo Bay, and Mts. of Colima, W. Mexico. Habits); Bull. U. S. Nat. Mus. No. 4, 1876, 24 (Tapana, Isth. Tehuantepec; April.—"Iris red").—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Ft. Brown, Texas; very abundant); *ib.* II, Oct. 1877, 85 (habits; descr. of eggs and young.—"Iris blood-red" in adult; brown in young).—COUES & SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. Feb. 1878, 23 (Fort Brown, Tex.—Syn., diag., remarks).

Molothrus robustus, CABAN., Mus. Hein. I, 1851, 193; J. f. O. 1861, 81.

β. armenti.

Molothrus armenti, CABAN., Mus. Hein. I, 1851, 192; J. f. O. 1861, 82.—CASS., P. A. N. S. March, 1866, 18 (Demarara; Savanilla, New Granada).

* On June 13, 1877, I found an egg of this variety in a nest of *Amphispiza bilineata* that contained three young and two addled eggs. The Cowbird's egg was cracked almost entirely across the middle, and in it was one of the addled Sparrow's eggs. This must have been done by some idle Mexican.

† Baird, Brewer, and Ridgway, North American Birds, ii, 157.

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SP. CH.—*Adult male:* Head, neck, back, and lower parts soft, silky bronze-black, of a peculiar shade, having a brassy greenish-olive cast, much like the plumage of the body in *Quiscalus æneus;* the feathers violet-black immediately beneath the surface, the basal portion of the feathers slaty-grayish; scapulars and rump more violet; wings in general, tail-coverts, and tail lustrous silky steel-blue, the tail-coverts and upper wing-coverts more violaceous, the primaries and rectrices more greenish in certain lights; tibiæ and anal region silky black; lining of the wings silky violet. Bill and feet deep black; *iris blood-red.* Wing, 4.60–4.80; tail, 3.70–3.80; culmen, .85–.90; tarsus, 1.15–1.25; middle toe, .85–.95. *Young male:* Uniform dull black, with a faint violet lustre on the back and rump, and a slight gloss of bottle-green on the wings and tail. *Adult female:* Uniform brownish-gray, darker above, where very faintly glossed with dull bluish, and paler beneath, many of the feathers of the wings and tail showing indistinctly paler edges, and feathers of the breast exceedingly indistinct darker shaft-streaks. Wing, 4.10; tail, 3.25; culmen, 0.75; tarsus, 1.05; middle toe, 0.85.

HAB.—Mexico and Central America, from the Rio Grande Valley (in the United States) to the Isthmus of Panama.

I have nothing of importance to add to the following notes, which appeared in the October (1877) number of the Bulletin of the Nuttall Ornithological Club, pp. 85–87:—

"The occurrence of this species north of Mexico was noted in the Bulletin of November, 1876 (Vol. I, p. 88). It is now more than a year since it was first observed, and during that time I have had ample opportunity to study its habits, a short account of which may be of interest. This Cowbird is found in Mexico, Guatemala, and Veragua, as well as in Southern Texas; how far it penetrates into the latter State I am unable to say. My first specimens were taken at Hidalgo, on the Rio Grande, seventy miles northwest of Fort Brown, where, however, they are not so abundant as lower down the river. Here they are common throughout the year, a small proportion going south in winter. Those that remain gather in large flocks with the Long-tailed Grackles, common Cowbirds, and Brewer's, Red-winged, and Yellow-headed Blackbirds; they become very tame, and the abundance of food about the picket-lines attracts them for miles around. *M. æneus* is readily distinguishable in these mixed gatherings from the other species by its blood-red iris and its peculiar top-heavy appearance, caused by its habit of puffing out the feathers of the head and neck. This habit is most marked during the breeding season and in the male, but is seen throughout the year.

"About the middle of April the common Cowbird, Brewer's, and Yellow-headed Blackbirds leave for the North; the Long-tailed Grackles have formed their colonies in favorite clumps of mesquite trees; the Redwings that remain to breed have selected sites for their nests; the dwarf Cowbirds (*Molothrus ater* var. *obscurus*) arrive from the South,

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and *M. æneus* gather in flocks by themselves, and wait for their victims to build. The males have now a variety of notes, somewhat resembling those of the common Cowbird, but more harsh. During the day they scatter over the surrounding country in little companies of one or two females and half a dozen males, returning at nightfall to the vicinity of the picket lines. While the females are feeding or resting in the shade of a bush, the males are eagerly paying their addresses by puffing out their feathers, as above noted, strutting up and down, and nodding and bowing in a very odd manner. Every now and then one of the males rises in the air, and, poising himself two or three feet above the female, flutters for a minute or two, following her if she moves away, and then descends to resume his puffing and bowing. This habit of fluttering in the air was what first attracted my attention to the species. In other respects their habits seem to be like those of the eastern Cowbird.

"My first egg of *M. æneus* was taken May 14, 1877,[*] in a Cardinal's nest. A few days before this a soldier brought me a similar egg, saying he found it in a Scissor-tail's (*Milvulus*) nest; not recognizing it at the time, I paid little attention to him, and did not keep the egg. I soon found several others, and have taken in all twenty-two specimens the past season. All but two of these were found in nests of the Bullock's, Hooded, and small Orchard (*I.* var. *affinis*) Orioles. It is a curious fact that although Yellow-breasted Chats and Red-winged Blackbirds breed abundantly in places most frequented by these Cowbirds, I have but once found the latter's egg in a Chat's nest, and never in a Red-wing's, though I have looked in very many of them.[†] Perhaps they feel that the line should be drawn somewhere, and select their cousins the Blackbirds as coming within it; the Dwarf Cowbirds are not troubled by this scruple, however. Several of these parasitic eggs were found under interesting conditions. On six occasions I have found an egg of both Cowbirds in the same nest; in four of these there were eggs of the rightful owner,[‡] who was sitting; in the other two the Cowbirds' eggs were alone in the nests, which were deserted: but I have known the Hooded Oriole to sit on an egg of *M. æneus* which was on the point of hatching when found; how its own disappeared I cannot say. Once two eggs of *æneus* were found in a nest of the small Orchard Oriole (var. *affinis*). Twice I have seen a broken egg of *æneus* under nests of Bullock's Oriole on which the owner was sitting.

"Early in June a nest of the Hooded Oriole was found with four eggs and one of *M. æneus*, all of which I removed, leaving the nest. Happening to pass by it a few days later, I looked in, and to my surprise found two eggs of *æneus*, which were taken: these were so unlike that

[*] In the Bulletin misprinted 1876.

[†] Since writing this, I have found this Cowbird's egg in a deserted Redwing's nest.

[‡] "It would be interesting to know what would have become of the three species in one nest, and had the latter been near the fort, where I could have visited them daily, I should not have taken the eggs. It is probable, however, that *M. æneus* would have disposed of the young Dwarf Cowbird as easily as of the young Orioles."

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they were probably laid by different birds. Still another egg, and the last, was laid in the same nest within ten days. But the most remarkable instance was a nest of the small Orchard Oriole found June 20, containing three eggs of *æneus*, while just beneath it was a whole egg of this parasite, also a broken one of this and of the Dwarf Cowbird. Two of the eggs in the nest were rotten; the third, strange to say, contained a living embryo. As the nest was certainly deserted, I can only account for this by supposing that the two rotten ones were laid about the first week of June, when there was considerable rain, and that the other was deposited soon after, since which time the weather had been clear and very hot. On one occasion I found a female *æneus* hanging with a stout thread around her neck to a nest of the Bullock's Oriole. The nest contained one young one of this Cowbird, and it is probable that its parent, after depositing the egg, was entangled in the thread on hurriedly leaving the nest, and then died; it had apparently been dead about two weeks. This case supports the view that the eggs or young of the owner are thrown out by the young parasite, and not removed by its parent, though I could find no trace of them beneath this nest.

"Twenty-two eggs of *M. æneus* average .90 by .70, the extremes being .95 by .75 and .82 by .65. The color is a greenish white, unspotted, soon fading to a dull opaque white. There is more than the usual variation in shape. Some are almost perfectly elliptical, others are nearly round; some are quite pointed at the smaller end, while others still are there abruptly truncate.

"The young, soon after leaving the nest, have the plumage uniform dull black; cheeks and sides of head bare; iris brown."*

87. *Agelæus phœniceus, (Linn.)

A common resident, breeding abundantly. The nests and eggs are smaller than the average of those found in more Northern States.—(DRESSER, Ibis, 1865, 492.—SENNETT, B. Rio Grande, 24.)

88. Xanthocephalus icterocephalus, (Bonap.)

Rather rare during winter, and I do not think that any breed, in this immediate vicinity at least.—(DRESSER, Ibis, 1865, 492.—SENNETT, B. Rio Grande, 24.)

89. *Sturnella magna, (Linn.)

Common during winter.—(SENNETT, B. Rio Grande, 24.)

*In the Ibis of January, 1861, pp. 61, 62, are the following notes by R. Owen on the supposed eggs of this species:—"The eggs are pale greenish white, and measure, axis 1 inch, diam. .75. A few eggs of the 'Tordito', taken from the nests of the 'Chorcha' (*Icterus*) and the 'Cien-Sante Mejicano' (*Mimus gracilis*). The Indians here all identify these eggs as those of the 'Tordito'. However, personally, I have never surprised the bird on the nest of any other species. At the same time I may add that I have never seen it either building or occupied in any other domestic occupation whatever, which somewhat confirms the statement aforesaid. The eggs are found most commonly in the nests of the 'Chorcha' and the 'Cien-Sante Mejicano', and occasionally in that of the largest species of 'Chatillo' (*Pitangus derbianus*)."—T. M. B.

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90. Sturnella magna *var.* mexicana, Scl.

"*Sturnella magna*", Swains., Philos. Mag. I, 1827, 436.

"*Sturnella hippocrepis*", Scl., P. Z. S. 1856, 30, 301; 1859, 58, 365, 381.—Scl. & Salv., Ibis, 1859, 19; 1860, 34.—Lawr., Ann. Lyc. N. Y. VIII, 1865, 177 (David, Veragua).

Sturnella mexicana, Scl., Ibis, 1861, 179; P. Z. S. 1864, 175 (City of Mexico); Catal. 1861, 139, No. 842 (Jalapa).—Cass., Proc. Ac. Nat. Sci. Phila. 1866, 24 (Mexico; Guatemala).—Salvin, P. Z. S. 1867, 142 (Veragua).

"*Sturnella ludoviciana*", Salv., P. Z. S. 1870, 191 (Veragua).

Sturnella magna var. *mexicana*, B. B. & R., Hist. N. Am. B. H, 1874, 172 (Mexico; Central Am.).—Lawr., Bull. U. S. Nat. Mus. No. 4, 1876, 24 (Barris and Sta. Efigenia, Isth. Tehuantepec; Sept., Feb.).

Sturnella magna, a. *mexicana*, Coues, Birds N. W. 1874, 190.

Summer specimens of the Meadow Lark found at Fort Brown have been identified by Mr. Ridgway as typical *mexicana*. Its notes and habits, as observed there, do not seem to differ essentially from those of *S. magna*. It is abundant from April until October.

[This Southern form may be easily distinguished from true *magna* by its smaller general size (including the bill) and much larger legs and feet, which are not only relatively, but absolutely, longer and stouter than in *S. magna*. The two specimens examined by me were obtained at Fort Brown, August 21 and September 13, 1877. They agree exactly with Mexican examples.—R. R.]

91. Icterus audubonî, Giraud.

This fine Oriole is found in moderate abundance, and is the only species that is resident. During the summer months, it is usually found in deep woods at some distance from houses, but during the winter it is less shy and retiring. They are frequently captured and offered for sale by Mexicans in this vicinity, but several I have kept would not sing at all in captivity. When free, their usual song is a prolonged and repeated whistle of extraordinary mellowness and sweetness, each note varying in pitch from the preceding. If once heard, it can never be forgotten. I have not succeeded in finding any nests. There is considerable variation in the extent of white edging to the wings and tail, some specimens closely approaching var. *melanocephalus*.—(Sennett, B. Rio Grande, 26.)

92. Icterus cucullatus, Swains.

This is perhaps the most common Oriole in this vicinity during the summer, arriving about the last week in March. It is less familiar than Bullock's Oriole, and, like the preceding species, is usually found in woods. The nests of this bird found here are perfectly characteristic, and cannot be confounded with those of any allied species; they are usually found in one of the two following situations: the first and most frequent is in a bunch of hanging moss, usually at no great height from the ground; when so placed, the nests are formed almost entirely by hollowing out and matting the moss, with a few filaments of a dark hair-like moss as lining; the second situation is in a bush (the name of

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which I do not know) growing to a height of about six feet, a nearly bare stem throwing out two or three irregular masses of leaves at the top; these bunches of dark green leaves conceal the nest admirably; it is constructed of filaments of the hair-like moss just referred to, with a little Spanish moss, wool, or a few feathers for the lining; they are rather wide and shallow for Orioles' nests, and, though strong, they appear thin and delicate. A few pairs build in Spanish bayonets (*Yucca*) growing on sand ridges in the salt prairies; here the nests are built chiefly of the dry, tough fibres of the plant, with a little wool or thistle-down as lining; they are placed among the dead and depressed leaves, two or three of which are used as supports. A large series of eggs now before me are quite characteristic, and can readily be distinguished from eggs of our other Orioles by the absence of irregular blotches and pen-marks and by the white or very slightly bluish ground-color. The markings are chiefly at the larger end in an irregular ring of spots of varying shades of brown and lilac. Some sets are precisely like large Vireos' eggs. The average size is .82 by .59, with comparatively little variation.—(SENNETT, B. Rio Grande, 25.)

93. * Icterus bullocki, Swains.

Common summer visitant. The breeding habits of this bird are quite unlike those of the Hooded Oriole. Instead of concealing its nest admirably in bunches of leaves or hanging moss, it is conspicuously placed at the extremity of an upper branch of a mesquite or ratama tree, usually at the edge of a prairie or near houses. One set of eggs has the ground-color a beautiful pinkish buff.—(SENNETT, B. Rio Grande, 25.)

94. Icterus baltimore, (Linn.)

Two specimens taken in April. I think that Mr. Dresser is in error in stating in the Ibis that this Oriole breeds at Matamoras.—(DRESSER, Ibis, 1865, 493.)

95. * Icterus spurius *var.* affinis, Lawr.

This small race of the Orchard Oriole is found rather plentifully from the latter part of March until August. Nests found here are much smaller than Eastern ones; in size and shape, they are more like Vireos'. This species and Bullock's are frequently found breeding in small, irregular colonies composed of both species; the Hooded Oriole does the same, but with individuals of its own species only.—(DRESSER, Ibis, 1865, 493.—SENNETT, B. Rio Grande, 25.)

96. Scolecophagus cyanocephalus, (Wagl.)

Brewer's Blackbird is very abundant from about the first week in October until April.—(DRESSER, Ibis, 1865, 493.—SENNETT, B. Rio Grande, 27.)

97. * Quiscalus macrurus, Swains.

This handsome Grackle is a very common resident, and large numbers

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breed on the reservation. Early in April, after several weeks of noisy courtship, they begin to build in irregular colonies, and by the middle of the month have eggs. The nests are perhaps most frequently placed near the top of one of the main upright branches of a young mesquite-tree. They are strongly built of straws, leaves, and grasses, mud being used freely. Where Spanish moss is plentiful, the nests are sometimes composed entirely of it, and I have found them among tule-reeds where several species of Herons were breeding. I have also found their nests either supported by the lower part of the nest of the Caracara Eagle or in the same tree. The eggs, usually three in number, vary greatly in appearance; the ground-color is usually a greenish-white or purplish-brown, more or less heavily spotted and dashed with several shades of brown and black. These markings are apt to be heavier at the smaller end, which frequently has a much darker ground-color than the larger; and this is so often the case as to be rather characteristic. Forty-five eggs now before me give the following measurements:—average, 1.26 by .85; largest, 1.44 by .91; smallest, 1.16 by .82. The annual moult takes place in August. Unlike the Boat-tailed Grackle, the males of this race do not leave the females while incubating, but are jealous of intruders, and take their share of feeding the young. The various notes of this bird are quite indescribable, and must be heard to be appreciated. The long and heavy tail of this Grackle makes it easily recognizable at a long distance, but is rather inconvenient when there is much wind. At such times, the birds are obliged to "head up" wind, like so many sloops at anchor. They have a frequent and curious habit of throwing their heads up and far back, so that the reversed bill is almost parallel with the back.—(DRESSER, Ibis, 1865, 493.—SENNETT, B. Rio Grande, 27.)

98. Xanthura luxuosa, Less.

The Rio Grande Jay is a common resident about Fort Brown and higher up the river, but does not seem to pass much into the interior of Texas. It is a noisy and gaudy species, soon making its presence known by its harsh cries or by its green and yellow plumage, seen for a moment as it moves about. Though at times shy, it is often very tame and bold, entering tents and taking food off plates or from the kitchen whenever a good opportunity offers. Large numbers are caught by the soldiers in traps baited with corn, but the plumage is their only attraction as a cage-bird. Its eggs and nest were first described in vol. i, p. 89, of the Bulletin of the Nuttall Ornithological Club. Since that time, I have found several other nests, but they do not affect the statements above made in regard to their breeding habits.—(DRESSER, Ibis, 1865, 495.—SENNETT, B. Rio Grande, 29.)

99. Sayornis fuscus, Gmel.

Not uncommon from October until April.—(DRESSER, Ibis, 1865, 473.)

100. Sayornis sayus, Bonap.

More abundant than the preceding during the winter months.—(DRESSER, Ibis, 1865, 473.)

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101. Contopus borealis, (Swains.)

Not rare during the migrations.—(DRESSER, Ibis, 1865, 474.)

102. Contopus virens, (Linn.)

Breeds; a few pass the winter.—(DRESSER, Ibis, 1865, 474.—SENNET, B. Rio Grande, 33.)

103. Contopus richardsoni, (Swains.)

August.—(DRESSER, Ibis, 1865, 474.)

104. Empidonax minimus, Baird.

September.—(DRESSER, Ibis, 1865, 474.—SENNETT, B. Rio Grande, 33.)

105. Empidonax acadicus, (Gmel.)

Two specimens taken in the spring.—(DRESSER, Ibis, 1865, 475.)

106. Empidonax pusillus *var.* **traillii**, (Aud.)

August 7, 1876.—(*E. traillii*, DRESSER, Ibis, 1865, 474.)

107. Empidonax flaviventris, Baird.

A single specimen taken.—(DRESSER, Ibis, 1865, 475.)

108. Tyrannus carolinensis, (Gmel.)

Rather common during the migrations, arriving about the first week in April and September.—(DRESSER, Ibis, 1865, 472.—SENNETT, B. Rio Grande, 31.)

109. * Milvulus forficatus, (Gmel.)

Common summer visitor, arriving about March 20 and leaving in September and October. Several pairs of this exquisite Flycatcher build in the low trees surrounding the parade-ground of the fort. The nests resemble those of the Kingbird, but are smaller, and, as a rule, are not more than six or seven feet from the ground. The eggs are from three to five in number, and are deposited by the latter part of April. The annual moult takes place in July and August. About the middle of October, 1876, just before sunset, a flock of at least one hundred and fifty of these birds passed over the fort: they were flying leisurely southward, constantly pausing to catch passing insects; and in the rays of the setting sun their salmon-colored sides seemed bright crimson.—(DRESSER, Ibis, 1865, 472.)

110. Myiarchus crinitus, (Linn.)

Taken in March and April. I am confident that none of this variety remain to breed.—(DRESSER, Ibis, 1865, 473.—SENNETT, B. Rio Grande, 32.)

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111. Myiarchus erythrocercus *var.* cooperi.

? Tyrannus cooperi, KAUP,* P. Z. S. Feb. 11, 1851, 51 ("Northern America and Chili").

Myiarchus cooperi, BAIRD, Birds N. Am. 1858, 180; Catal. N. Am. B. 1859, No. 132.—SCL., P. Z. S. 1859, 384; Catal. 1861, 232, No. 1428 (Mexico; Guatemala).—SCL. & SALV., Ibis, 1859, 122, 440; 1870, 837 (coast Honduras).—LAWR., Ann. Lyc. N. Y. ix, 1869, 202 (Yucatan).

Myiarchus crinitus, *c.* var. *cooperi*, COUES, P. A. N. S. July 2, 1872, 67 (Tehuantepec, Mazatlan, and Guadalajara, S. W. Mexico; Guatemala ?).

Myiarchus crinitus var. *cooperi*, B. B. & R., Hist. N. Am. B. II, 1874, 331 (Mazatlan, Tehuantepec, and Yucatan).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 28 (Tapana and Sta. Efigenia, Isth. Tehuantepec; April; Dec.).

? Tyrannus mexicanus, KAUP,† P. Z. S. Feb. 11, 1851, 51 (*loc. incog.*).

Myiarchus mexicanus, LAWR., Ann. Lyc. N. Y. IX, 1869, 202 (Yucatan); Pr. Boston Soc. June 7, 1871 (Tres Marias Islands, W. Mexico).—SUMICHR., Mem. Boston Soc. I, 1869, 557, 560 (Vera Cruz; hot region).

Myiarchus yucatanensis, LAWR., P. A. N. S. Nov. 21, 1871, 235 (Yucatan, Mus. G. N. L.=*M. mexicanus*, Ann. Lyc. N. Y. IX, 1869, 202!).

Myiarchus crinitus erythrocercus, COUES & SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. vol. iv, No. 1, Feb. 1878, 32 (Ft. Brown, Texas).

Alguacil de Moscas, Tres Marias vernac. (*fide* LAWR., *l. c.*).

The occurrence of this variety within our limits was noted in the April (1878) number of the Bulletin of the Nuttall Ornithological Club. Since that time I have paid particular attention to the species, and find that it is the only one of the genus that breeds on the Lower Rio Grande, which it does in considerable numbers. In its notes and habits, it appears to closely resemble the *M. crinitus*. Seven identified sets of thirty-two eggs average .93 by .66, the extremes being 1.03 by .73 and .82 by .65. With one exception, no snake-skins were used in the construction of any of these nests. They were composed of felted locks of wool and hairs, and were placed not far from the ground, either in old Woodpeckers' holes or in natural hollows in decayed trees or stumps.

NOTE.—The eggs of the *Myiarchus*, as a genus, have a very remarkable family resemblance. They are of a rounded-oval shape, in some instances the relation of the axis to the diameter being as $8\frac{1}{2}$ to $7\frac{1}{2}$, and averaging about $8\frac{1}{2}$ to 7. The ground-color varies from a light buff to a dark cream-color; over these are distributed two sets of markings, all of them having a longitudinal direction, often narrow lines, leaving broad, unmarked spaces between them, and not unfrequently expand-

* "With shorter wings than *mexicana*, but with longer bill, like *crinita*; throat and over breast light gray, not so dark as in *crinita*; the black stripe along the inner webs of the tail-feathers is broader, like *stolida*." [Type in Brit. Mus.]

† "With short wings; all the wing-feathers, except the first, with rufous margins; breast light ash-gray; above lighter." [Type in Brit. Mus.]

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ing into broad and confluent patches about the larger end. This genus is represented in my collection by the present species, and *M. crinitus*, *M. mexicanus*, *M. cooperi*, and *M. validus*, of Jamaica. In all these, except the last, the two very distinct colorations are more or less noticeable: these are a deep shade of reddish-brown and a lighter marking of dark stone-color or slate, with slight tinge of purple or lilac. In the *Myiarchus crinitus*, the dark brown is the predominant color; in *M. erythrocercus*, the stone-colored markings are much more abundant than in any of the others; in *M. validus*, on the contrary, these are wholly wanting. The set of eggs identified by Dr. Merrill, five in number, range from .99 to .94 of an inch in length and from .69 to .74 in breadth, averaging .97 by .72½. Another set of three, not identified, but undoubted, average 1.02 by .72. A third set, from the collection of the late Dr. Berlandier, and hitherto supposed to belong to *M. mexicanus*, are marked with stone-colored dashes that are much darker and have a decidedly purplish tinge. These average .95 by .74.

A set of five eggs, from California, of *M. mexicanus*, average .84 by .69, and another set .84 by .68. In these, the markings of both kinds are fewer, and the greater part of these in slender lines, the purplish-slate being about as abundant as the reddish-brown stripes. Five eggs of *M. crinitus* average .95 by .71¾, are deeply marked, and chiefly with the brown stripes. The eggs of *M. cooperi* average .91½ by .73, and are very similar to those of *M. mexicanus*, except in size. The egg of *M. validus* is marked by but one kind of colored stripe, a combination of lilac and red-brown. The ground-color is more distinctly a deep and warm shade of cream: measurement, .84 by .69.—T. M. B.

NOTE BY R. R.—The proper name of this species has been a subject of much discussion and difference of opinion, but it seems now generally settled that it is to be known as *erythrocercus*, Scl. & Salv. Admitting that two races may be distinguished (a smaller Southern, and a larger Northern, with grayer colors), it is less easy to decide what name the Northern race should bear,—the Southern one being, of course, the typical *erythrocercus*. As to point of date, the choice evidently lies between *Tyrannula mexicana* and *T. cooperi* (1857), both these names first occurring on the same page, but *mexicana* first, and therefore entitled to priority. The difficulty is that neither of the brief diagnoses accompanying these names give any character of even the least importance, and are therefore no aid whatever in determining what species is meant. The types of both these birds are said to exist in the British Museum; and Dr. P. L. Sclater, who has examined that of *T. mexicana*, says that it is the same as the bird called *M. cooperi* (Kaup) by Professor Baird, in Birds N. Am. 1858, 180. If this be true, it raises the question as to whether Professor Baird's identification of Kaup's *T. cooperi* was correct, since it seems strange that the latter author would, on the same page, describe different specimens of the same bird as distinct species! It

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seems to be generally conceded, however, that Professor Baird was right in this determination; therefore, as Dr. Coues surmises (Pr. Ac. Nat. Sci. Phila. 1872, p. 68), *Tyrannula mexicana*, Kaup, and *T. cooperi*, Kaup, must have been based upon variations of one species—the one under consideration!

In attempting to determine to which of the two forms of the species Dr. Merrill's specimens belonged, I found it necessary to carefully examine all the material available. This consisted of twenty-four specimens, belonging chiefly to the collection of the National Museum. After taking careful measurements of every specimen, and submitting all to the closest scrutiny and comparison, I found myself forced to a conclusion different from that reached by Dr. Coues (see Bull. U. S. Geol. and Geog. Surv. Terr. IV, No. 1, pp. 32, 33), in whose opinion regarding the matter I had previously coincided. I now find, that (1) while extreme examples of var. *cooperi* are astonishingly different from *erythrocercus* proper, such individuals form a very small proportion of the whole, and are chiefly from Western and Southwestern Mexico, where several other species of birds, notably *Pyranga æstiva* (var. *cooperi*, Ridgw.), attain the same great development of the bill (and, in fact, all the measurements); that (2) nearly all specimens from Mexico and Guatemala should be referred to *cooperi*, examples referable to *erythrocercus* on account of dimensions and shades of color being comparatively rare. Besides averaging larger than var. *erythrocercus*, var. *cooperi* has usually a grayer cast of plumage, in this respect corresponding to the Mexican race of *Tyrannus melancholicus* (var. *couchi*, Baird), *Myiarchus lawrencii*, and numerous other birds of similar geographical distribution. The only satisfactory test, however, which I have been able to apply in determining to which race doubtful specimens should be referred is that of size, as follows:—

Var. ERYTHROCERCUS.—Wing, 3.40–3.95 (average, 3.77); tail, 3.60–4.00 (average, 3.82); bill, from nostril, .55–.68 (average, .61); tarsus, .85–.88 (average, .86).* *Hab.*—Eastern Tropical America, from Paraguay to Southern Mexico, but chiefly southward of the latter country.

Var. COOPERI.—Wing, 3.85–4.45 (average, 4.15); tail, 4.00–4.60 (average, 4.25); bill, from nostril, .60–.82 (average, .69); tarsus, .88–.95 (av-

* Six specimens, as follows:—

Museum No.	Sex and age.	Museum.	Locality.	Date.	Wing.	Tail.	Bill from nostril.	Tarsus.
16348	♀ ad.	U. S.	"Brazil"	Aug. —, 1859	3.65	3.60	.58	.85
16349	— ad.	U. S.	Paraguay	May —, 1859	3.75	3.80	.60	.85
29423	— ad.	U. S.	Costa Rica		3.90	3.80	.62	.88
39210	♂ ad.	U. S.	Merida, Yucatan	May 29, 1865	3.95	3.95	.68	.85
39213	— ad.	U. S.	...do	Apr. 9, 1865	3.40	3.75	.55	.88
57649	♂ ad.	U. S.	Sta. Efigenia, Tehuantepec	Dec. 18, 1868	3.95	4.00	.65	.85

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erage, 92).* *Hab.*—Mexico (including Lower Rio Grande Valley in Texas) and Guatemala.

The principal references to var. *erythrocercus* are the following:—

?*Tyrannula irritabilis*, BONAP., Consp. I, 1850, 189. Supposed to belong here from quotation of Azara. "South America." Not *Tyrannus irritabilis*, Vieill.!

Myiarchus crinitus, b. var. *irritabilis*, COUES, P. A. N. S. July 2, 1872, 65 (Central and South America, Paraguay, Rio Parana, Bahia, Venezuela, Yucatan, Guatemala, Costa Rica).

Myiarchus crinitus var. *irritabilis*, B. B. & R., Hist. N. Am. B. II, 1874, 331 (Paraguay to Costa Rica).

Myiarchus erythrocercus, SCL. & SALV., P. Z. S. 1868, 631, 632 (Venezuela); Nom. Neotr. 1873, 52.—?SEMPER, P. Z. S. 1871, 271 (Sta. Lucia, W. I.!); 1872, 650.

Pyrocephalus erythrocercus, GRAY, Hand-list, I, 1869, No. 5522 (s. g. *Myionax*. Quotes "*crinitus*, p., Hartl.; *irritabilis*, p., Bp.; *ferox* ♂, Burm.").

Pipperie gran-bois, St. Croix vernac. (*fide* SEMPER, *l. c.*).

112. Myiarchus cinerascens, LAWR.

Only two specimens of this variety were taken.—(*M. mexicanus*, DRESSER, Ibis, 1865, 473.)

113. Pyrocephalus rubineus *var.* mexicanus, Sclat.

Resident, but more abundant in summer than in winter. During the breeding season, the male frequently utters a peculiar twittering song while poised in the air about thirty feet from the ground; during the song, it frequently snaps its bill as if catching insects. Its note of anger and alarm is a mew. Except during the breeding season, the birds are decidedly shy. The nests are usually placed upon horizontal forks of ratama-trees, growing upon the edge of a prairie, and rarely more than six feet from the ground. They bear considerable resemblance to nests of the Wood Pewee in appearance and in the manner in which they are saddled to the limb; the bottoms are made of small twigs, over which

* Eighteen specimens, as follows:—

Museum No.	Sex and age.	Museum.	Locality.	Date.	Wing.	Tail.	Bill from nostril.	Tarsus.
9100	— ad.	U. S.	"Mexico" (*M. cooperi*, Baird, B. N. Am.)	.....	4.10	4.00	.69	.90
29090	— ad.	U. S.	Mexico	.....	4.05	4.05	.62	.88
37364	— ad.	U. S.	Tres Marias, Western Mexico	Jan. —, 1865	4.10	4.20	.70	.93
52810	♂ ad.	U. S.	Mazatlan, Mexico	.....	4.30	4.20	.70	.95
1182	♂ ad.	R. R.	.....do	.....	4.30	4.40	.72	.95
2197	— ad.	R. R.	Tehuantepec, Southern Mexico	Dec. 18, 1868	4.05	4.05	.65	.92
—	♂ ad.	R. R.	.....do	Dec. 24, 1868	4.00	4.25	.75	.92
57040	♀ ad.	U. S.	.....do	Dec. 16, 1868	4.25	4.55	.60	.90
58644	♂ ad.	U. S.	.....do	May 5, 1869	3.85	4.00	.72	.88
58815	♂ ad.	U. S.	.....do	Apr. 27, 1869	4.10	4.30	.68	.92
59617	— ad.	U. S.	.....do	Oct. 8, 1869	4.15	4.25	.68	.88
73031	♂ ad.	U. S.	.....do	Apr. 11, 1871	4.10	4.20	.68	.95
73032	♂ ad.	U. S.	.....do	May 27, 1871	4.40	4.60	.75	.95
73033	♂ ad.	U. S.	.....do	May 27, 1871	4.05	4.15	.73	.98
42337	— ad.	U. S.	Guadalajara, Southern Mexico	.....	4.45	4.60	.82	.95
71138	♀ ad.	U. S.	Fort Brown, Texas	May 10, 1877	4.05	4.20	.65	.90
73022	♂ ad.	U. S.	.....do	Apr. 1, 1876	.....	.....	.....	.....
49312	— ad.	U. S.	Central Guatemala	.....	4.15	4.15	.62	.90

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are various soft materials felted together; a few hairs or a little wool form the lining; the rims are covered with lichens; the cavity is slight, varying from .8 to 1.25 inch in depth by 2 in width, and the whole structure is easily overlooked. The usual number of eggs is three; the ground-color is a rich creamy-white, with a ring of large brown and lilac blotches at the larger end. Fourteen eggs now before me average .73 by .54. A nest of this species, found May 19, 1877, contained a young Dwarf Cowbird and three addled eggs, which latter I removed. On revisiting the same nest ten days later, I found three fresh eggs, on which the female was sitting. As the young Cowbird could not have been fledged by this time, it would seem as if the Flycatchers, on finding that their eggs had been removed, had thrown out the parasite and laid again.—(*P. rubineus*, DRESSER, Ibis, 1865, 475.—*P. rubineus mexicanus*, SENNETT, B. Rio Grande, 34.)

114. Ceryle aloyon, (Linn.)

Not common from October until April.—(DRESSER, Ibis, 1865, 471.—SENNETT, B. Rio Grande, 36.)

115. Ceryle americana *var.* **cabanisi**, (Tschudi.)

Two specimens, obtained in May and October respectively. The scarcity of Kingfishers on the lower Rio Grande is doubtless due to the muddy water, that renders it difficult for them so see their prey.—(*C. americana*, DRESSER, Ibis, 1865, 472.)

Genus NYCTIDROMUS, Gould.

Nyctidromus, GOULD, Icon. Av. II, 1838. (Type, *N. derbyanus*, Gould.)—GRAY, List Genera B. ed. 2, 1841, 10; Gen. and Subg. 1855, 11; Hand-list, I, 1869, 60.—GRAY & MITCH., Genera B. I, 1849, 48.—CASSIN, P. A. N. S. 1851, 179.—SCL., P. Z. S. 1866, 144.—SCL. & SALV., Nom. Neotr. 1873, 97.—BOUCARD, Cat. Av. 1876, No. 2291.

Eucapripodus, LESSON, 1843 (*fide* GRAY).

Lucapripodus, LESSON, 1847 (*fide* GRAY).

CH.—Similar to "*Antrostomus*", but having the tarsus longer than the middle toe, and completely naked; the tail about equal to the lengthened wing (instead very much shorter), and the third instead of the second primary longest; lateral toes less than half as long as the middle toe, including the claw.

The characters given above are all that I am able to discover as distinguishing the present form from the species referred by most writers to the so-called genus *Antrostomus*, Gould. After very careful comparisons of species of true *Caprimulgus* (as restricted) with those of the so-called genera *Antrostomus* and *Stenopsis*, I am at a loss to find characters of generic importance between them. *A. carolinensis*, the type of the former genus, differs, it is true, from all the others in possessing lateral filaments to the rictal bristles, while *A. nuttalli* is aberrant in other respects. There is such a difference in the details of form between almost every two species, however, that it is seriously questionable

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whether they should not all be included under *Caprimulgus*. The only alternative seems to be a further subdivision of one or more of the so-called genera, especially "*Antrostomus*", leaving *A. carolinensis* as the typical and only species, referring *A. vociferus* to *Caprimulgus*, and instituting a new genus for *A. nuttalli*. The following scheme may serve to show the nature of the differences between the three North American species usually included in *Antrostomus* and the genus *Nyctidromus*:—

A.—Tarsus feathered in front almost to the toes, and shorter than the middle toe; first quill longer than the fourth.

1. CAPRIMULGUS.—Rictal bristles without lateral filaments. Sexes with the tail differently marked. Tail rounded. (Including *C. vociferus*.)
2. "ANTROSTOMUS."—Rictal bristles with fine lateral filaments. Sexes with the tail differently marked. Tail rounded. (Including only the type, *A. carolinensis*.)

B.—Tarsus entirely naked in front, and longer than the middle toe; first quill shorter than the fourth.

3.—Tail even, much shorter than the wing. Sexes with the tail not differently marked. Plumage with a peculiarly soft, velvety surface. (*C. nuttalli* only.)
4. NYCTIDROMUS.—Tail rounded, equal to the wing. Sexes with the tail differently marked.

116. *Nyctidromus albicollis.—Pauraque Goatsucker.

Montvoyan de la Guyane, BUFF., Hist. Nat. des Ois. VI, 1779, 549.

Crepaud-volant ou Tette-Chevre roux, de la Guiane, BUFF., Pl. Enl. 733 (= ♀).

White-throated Goatsucker, LATH., Synop. II, pt. ii, 1785, 596, No. 7.

Guiana Goatsucker, LATH., *t. c.* 598, No. 9.

Caprimulgus albicollis, GMEL., S. N. I, ii, 1788, 1030 (*ex* LATH., *l. c.*).—LATH., Ind. Orn. II, 1790, 575, No. 7.—VIEILL., Enc. Méth. 1823, 536, No. 4.—LICHT., Verz. Doubl. 1823, 59, 606.—D'ORB., Guerin's Mag. 1837, 67.—HARTL., Ind. Azara, 1847, 20, 310.—D'ORB. & LAFR., Rev. Zool. 1837, 67.—CABAN., in SCHOMB. Guiana, III, 1848, 710, No. 204.

Nyctidromus albicollis, BURM., Th. Bras. II, 1856, 389, No. 1.—SCL., P. Z. S. 1866, 124 (fig. of bones of foot), 144 (S. Mexico to S. Brazil).—SCL. & SALV., *ib.* 193 (Ucayali, E. Peru); 1867, 752 (Huallaga, E. Peru), 978 (Upper Amazon); 1869, 252 (Maruria, Venezuela), 598 (Conispata, Peru); 1870, 782 (S. of Merida, Venezuela), 837 (coast of Honduras); 1873, 186 (Peru), 290 (E. Peru); 1875, 237 (Venezuela); Nom. Neotr. 1873, 97 (Central America; S. Am. to Brazil).—LAWR., Ann. Lyc. N. Y. IX, 1869, 204 (Yucatan); Pr. Boston Soc. 1871, — (Tres Marias Islands, W. Mexico; common); Mem. Boston Soc. II, 1874, 291 (Mazatlan, Colima, and Tres Marias, W. Mexico); Bull. U. S. Nat. Mus. No. 4, 1876, 31 (Isth. Tehuantepec).—WYATT, Ibis, 1871, 375 (L. Paturia, New Granada).—LEE, Ibis, 1873, 134 (Buenos Ayres).—LAYARD, *ib.* 389 (Pará).—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Fort Brown, Texas, April and May; not rare; breeding).

Caprimulgus guianensis, GMEL., S. N. I, ii, 1788, 1030 (based on BUFF., Pl. Enl. 733).—LATH., Ind, Orn. II, 1790, 586, No. 8.—MAX., Beitr. III, 1831, 318, No. 4.

Nyctidromus guianensis, CASS., P. A. N. S. 1851, 183, 189 (Cayenne; Surinam); Catal. Caprim. Mus. Phila. Acad. 1851, 12.—BURM., Syst. Ueb. II, 1856, 391.—SCL., Catal. Am. B. 1862, 281, No. 1690 (Orizaba; Bogota; Vera Paz; Esmeraldas, Ecuador; Trinidad); P. Z. S. 1864, 176 (City of Mexico).—TAYLOR, Ibis, 1864, 90 (Trinidad).—LAWR., Ann. Lyc. N. Y. VII, 1861, 290 (Isth. Panama).—SCL. & SALV., P. Z. S. 1864, 364 (Isth. Panama).—PELZ., Orn. Bras. 1871, 13.—SALVIN, P. Z. S. 1870, 204 (Veragua).

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Ibiyau, AZARA, Apunt. 1801, No. 310.

Nyctidromus americanus, CASSIN, Pr. A. N. S. 1851, 179, 180; Catal. Caprim. Mus. Phila. Acad. 1851, 12 (Nicaragua).—SCL., P. Z. S. 1856, 285; 1859, 367 (Jalapa, E. Mexico).—SCL. & SALV., Ibis, 1859, 125, 173 (Guatemala).—CABAN. & HEINE, Mus. Hein. III, 1860, 92 (Jalapa; Porto Cabello; Guiana; Brazil).—LAWR., Ann. Lyc. N. Y. VII, 1861, 290 (Isth. Panama).—SALVIN, Ibis, 1866, 203 (Guatemala).—COUES & SENNETT, Bull. U. S. Geol. Surv. Terr. vol. iv, No. 1, Feb. 1878, 34 (Brownsville, Texas).

Nyctidromus affinis, GRAY, List B. Brit. Mus. II, 1844, 11, No. 2.

Nyctidromus derbyanus, GOULD, Icon. Av. II, 1838, pl. 2.—GRAY & MITCH., Genera B. I, 1849, 48.—BONAP., Consp. I, 1850, 62.

Caprimulgus grallarius, WIED, Mus. Lugd. (*teste* BONAP., Consp. I, 1850, 62).

Nyctidromus grallarius, BONAP., Consp. I, 1850, 62 (Brazil).—CASSIN, P. A. N. S. 1851, 179, 183; Catal. Caprim. Mus. Phila. Acad. 1851, 12 (Bogota).—BURM., Th. Bras. II, 1856, 392.

Caprimulgus latiocaudatus, DRAPIEZ, Dict. Class. Hist. Nat. VI, 1824, 169 (*teste* CASSIN).

SP. CH.—*Adult male:* Wing, 6.75; tail, 6.75; tarsus, 1.10; middle toe, .80. Tarsus and heel-joint completely bare. Above, finely mottled brownish-gray, the crown with a central series of black, longitudinal dashes, the scapulars beautifully variegated with black and creamy-buff or ochraceous, in large, somewhat V-shaped, markings; wing-coverts with large terminal spots of creamy-buff or ochraceous. Basal portion (sometimes almost the basal half) of the exposed portion of the larger primaries white, including both webs, and forming a conspicuous patch; remainder of the quills uniform plain dusky. Outer tail-feather (on each side) nearly plain blackish throughout; next feather chiefly white, with the greater portion of the outer web blackish; third feather chiefly white, with the outer web margined more or less with dusky; four middle tail-feathers without any white, the ground-color being mottled-grayish, variegated by ragged, badly defined "herring-bone" blotches of blackish along the shaft. Lower parts deep buff or creamy-ochraceous, the throat crossed by a distinct collar of pure white, the remaing portions transversely barred or "rayed" with dusky, these bars wider apart posteriorly.

Adult female: Wing, 6.00–6.30; tail, 5.80–6.00. Generally similar to the male, but smaller, the colors less pure, the markings less sharply contrasted, and the white areas of the primaries and rectrices more restricted. General hue of the plumage decidedly more brownish; white patches on the primaries situated rather farther toward the ends of the feathers, occupying only the outer four (instead of six) quills; of smaller extent than in the male, and more or less tinged with ochraceous. White of the rectrices occupying only the terminal portion (from 0.75 of an inch to 1.75 inches) of the inner web of the second and third tail-feathers (counting from the outer), the blackish portions of these feathers broadly though somewhat irregularly barred and mottled with ochraceous. White gular collar less distinct than in the male.

With a somewhat close general resemblance to the Whip-poor-will (*Caprimulgus vociferus*), this species may be at once distinguished by

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the wholly naked tarsi, the white patch across the primaries, which are also destitute of ochraceous spots, by the much longer and differently marked tail and other features. It is, in fact, a far handsomer bird, and, not excepting even the "*Antrostomus*" *nuttalli*, is by far the most beautiful of the *Caprimulgidæ* which occur in the United States. It is a species of very wide distribution, its range comprising the whole of the intertropical portions of America on both sides of the equator, with the exception of the West India Islands, from none of which it has thus far been recorded. It is subject to considerable variations of color, which have given rise to a number of synonyms, as may be seen by reference to the citations given above, but the variations seem to be of an individual and sexual nature, rather than geographical.—R. R.

This interesting addition to the avifauna of the United States proves to be a rather common summer visitor, arriving early in March, at least a month before any others of the family, and remaining as late, at least, as November 16, on which date I have taken two specimens. My first specimen was shot on the 1st of April, 1876, and its capture noted in the Bulletin of the Nuttall Ornithological Club, vol. i, p. 88. Since that time, I have taken quite a number of specimens, and found several sets of eggs. The habits and eggs of this species, in addition to its anatomical characters, show its affinity with the Whip-poor-wills rather than the Nighthawks. It frequents shady thickets and copses (where these can be found), and when flushed dodges rapidly and silently among the bushes, but soon alights, only to repeat the short flight when again approached. The eggs are deposited in such a situation, usually at the foot of a bush; the parent, when started from her eggs, makes no attempt to decoy one away, but flying a few yards alights to watch the intruder, frequently raising herself on her legs and nodding in a curious manner, uttering at the same time a low, whining sound. Their notes are among the most characteristic night sounds of the Lower Rio Grande, and are constantly heard at evening during the summer months. They consist of a repeated whistle resembling the syllables *whew-whew-whew-whew-whe-e-e-e-e-w*, much stress being laid upon the last, which is prolonged. The whole is soft and mellow, yet can be heard at a great distance. The preliminary *whews* vary somewhat in number, and late in the season are often omitted altogether. The eggs are a rich creamy-buff color, sparingly marked with a deeper shade of the same and with lilac.

Specimens average 1.25 by .92 inches.

On the 15th of May, 1876, I found a set of eggs near camp at Hidalgo, and on returning in about fifteen minutes to secure the parent, who had disappeared among the thickets, I found that she had removed the eggs, although they had not been touched. At least two pairs breed annually within Fort Brown, part of the reservation affording them the shade and shelter they always seek.

117. Antrostomus carolinensis, (Gmel.)

A few taken during the migrations.—(DRESSER, Ibis, 1865, 470.)

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118. Antrostomus vociferus, (Wils.)

Rather uncommon in spring and autumn.

119. Chordeiles popetue, (Vieill.)

Appears to be a rather rare visitant in spring and autumn.—(DRESSER, Ibis, 1865, 471.)

120. Chordeiles popetue *var.* henryi, Cassin.

Abundant during the summer months, arriving about the 1st of April, and leaving in September. Deposit their eggs near the edges of prairies. Specimens said by Ridgway to be smaller than typical *henryi*.—(*C. henryi*, DRESSER, Ibis, 1865, 471.)

121. * Chordeiles acutipennis *var.* texensis, Lawr.

Common summer visitor, arriving early in April. While var. *henryi* is usually found about prairies at some distance from houses, the present species is most plentiful just outside of Brownsville, and I have found several sets of eggs within the fort. These are usually deposited in exposed situations, among sparse chaparral, on ground baked almost as hard as brick by the intense heat of the sun. One set of eggs was placed on a small piece of tin, within a foot or two of a frequented path. The female sits close, and when flushed flies a few feet and speedily returns to its eggs. They make no attempt to decoy an intruder away. I have ridden up to within five feet of a female on her eggs, dismounted, tied my horse, and put my hand on the bird before she would move. This species is more strictly crepuscular than var. *henryi* or *popetue*, and is very seldom seen on the wing during the day. The notes are a mewing call, and a very curious call that is with difficulty described. It is somewhat like the distant and very rapid tapping of a large Woodpecker, accompanied by a humming sound, and it is almost impossible to tell in what direction or at what distance the bird is that makes the noise. Both these notes are uttered on the wing or on the ground, and by both sexes. The eggs vary considerably, but exactly resemble the surface on which they are placed. The ground color is usually clay: some are very sparingly dotted with brown; others mottled with light-brown and obscure lilac; others still are so thickly marbled with brown and lilac on a dark ground as to give them a granite-like appearance. They average 1.07 by .77.—(*C. texensis*, DRESSER, Ibis, 1865, 471.—SENNETT, B. Rio Grande, 34.)

122. Chætura pelagica, (Linn.)

Not uncommon during the migrations, arriving about March 20 and returning in September.

123. Trochilus colubris, Linn.

Abundant during the spring and autumn migrations, but I was not able to satisfy myself that any remained to breed or to pass the winter,

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though I have seen them as late as December 7 and as early as March 9.—(DRESSER, Ibis, 1865, 470.—SENNETT, B. Rio Grande, 35.)

124. Amazilia fuscicaudata.

Trochilus fuscicaudatus, FRASER, P. Z. S. Feb. 11, 1840, 17 (Chachapoyas, Peru).
Hylocharis fuscicaudatus, GRAY & MITCH., Genera B. I, 114, sp. 26.
Saucerottia fuscicauda, REICHENB., Troch. Enum. 1855, 8, t. 696, figs. 4552–'53.
Trochilus riefferi, BOURCIER, Ann. Sci. Phys. et Nat. Lyon, 1843, 45; Rev. Zool. 1843, 103 (Fusagasuga, New Granada).
Amazilius riefferi, BONAP., Consp. I, 1850, 78; Rev. Zool. 1854, 254.—SCL., P. Z. S. 1856, 140; 1857, 16 (Bogota); 1859, 145 (Pallatanga, Ecuador).
Amazilia riefferi, REICHENB., Av. Syst. Nat. 1849, pl. 39; Aufz. der Colibr. 1853, 10; Trochil. Enum. 1855, 8, t. 775, figs. 4798–'99.—GOULD, Monog. Trochilid. V, 1853, pl. 311.—SCL., P. Z. S. 1859, 145; 1860, 94 (New Granada), 283 (Babahoyo, Ecuador), 296 (Esmeraldas, Ecuador); Catal. Am. B. 1862, 314, No. 1878 (Coban, Vera Paz; Baranquilla, New Granada; Esmeraldas, Ecuador).—SCL. & SALV., Ibis, 1859, 130 (Guatemala); 1860, 40 (Dueñas, Guatemala); 1864, 365 (Panama); Nom. Neotr. 1873, 92 (Mexico; Central America; New Granada; Ecuador).—SALVIN, Ibis, 1860, 195, 270 (Coban, Vera Paz); P. Z. S. 1867, 156 (Veragua); Ibis, 1872, 320 (Nicaragua).—WYATT, Ibis, 1871, 378 (San Nicolas, New Granada; alt. 3,000 feet).
Polytmus riefferi, GRAY & MITCH., Genera B. I, 1849, 108, No. 72.—GRAY, Hand-list, I, 1869, 132, No. 1680 (S. Mexico; Guatemala; "Andes."—Subg. *Amazili*).
Pyrrhophæna riefferi, CABAN. & HEINE, Mus. Hein. III, 1860, 36.—GOULD, Introd. Trochilid. 1861, 158 ("Southern Mexico, Guatemala, and along the Andes to Ecuador"); P. Z. S. 1870, 803 (Citado, Ecuador).—LAWR., Ann. Lyc. N. Y. Oct. 23, 1865, 184 (Greytown, Nicaragua); *ib.* IX, 1868, 127 (Costa Rica); Bull. U. S. Nat. Mus. No. 4, 1876, 33 (Guichicovi, Isth. Tehuantepec).—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Ft. Brown, Texas, June, 1876; 2 specimens).
Eranna riefferi, HEINE, J. f. O. 1863, 188 (New Granada).
Trochilus aglaiæ, BOURC. & MULS., Ann. Soc. Phys. Sc. Lyon, 1846, 329; Rev. Zool. 1846, 316 (*hab. incog.*).—MULS., Hist. Nat. Ois. Mouch. I, ——, 319.
Polytmus aglaiæ, GRAY & MITCH., Genera B. I, 1849, 109, sp. 73.
Amazilius aglaiæ, BONAP., Consp. I, 1850, 71.
Saucerottia aglaiæ, REICHENB., Aufz. der Colibr. 1853, 10.
Chlorestes aglaiæ, REICHENB., Troch. Enum. 1855, 4.
Hemithylaca aglaiæ, CABAN. & HEINE, Mus. Hein. III, 1860, 38, note 13.
Ornismya amazili, DELATTRE, Écho du Monde Sav. No. 45, June 15, 1843, col. 1069.
"*Trochilus arsinoides*, SAUC., in Mus. of Berlin" (GOULD).
Trochilus dubusi, BOURC., Soc. Agric. Lyon, 1852, 141.
Amazilia dubusi, REICHENB., Aufz. der Colibr. 1853, 10; Trochil. Enum. 1855, 8, pl. 778, figs. 4809–'10
Eranna dubusi, HEINE, J. f. O. 1863, 188 (Veragua; Guatemala; Costa Rica; S. Mexico).
Amazilius dubusi, BONAP., Rev. et Mag. de Zool. 1854, 254.—SCL., P. Z. S. 1856, 287; 1859, 386; 1860, 296.
Pyrrhophæna dubusi, CABAN. & HEINE, Mus. Hein. III, 1860, 36.
Eranna jucunda, HEINE, J. f. O. 1863, 188 (Babahoyo and Esmeraldas, Ecuador).
Pyrrhophæna sauvis, CABAN. & HEINE, Mus. Hein. III, 1860, 38 (Cartagena, New Granada).
Eranna sauvis, HEINE, J. F. O. 1863, 188 (Cartagena).

SP. CH.—Above metallic grass-green (varying to golden-green), more

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bronzy on the crown and rump; longer upper tail-coverts cinnamon-rufous. Tail deep chestnut-rufous, the feathers tipped and edged for a greater or less distance from their ends with metallic greenish-bronze, glossed with purple; wing-coverts metallic green, like the back; rest of the wing uniform dusky slate, with a distinct violet purple gloss in certain lights. Side of the head bronzy-green, the lores bright cinnamon-rufous. Throat, jugulum, breast, and sides metallic green, most brilliant on the breast and jugulum, where bright emerald in certain lights, duller and more bronzy on the sides; throat-feathers grayish-white beneath the surface, this color showing wherever the feathers are disturbed. Abdomen pale mouse-gray; crissum deep cinnamon-rufous; anal tufts and thighs cottony-white. Bill reddish at the base for a greater or less distance (pale brownish in the dried skin), the terminal portion blackish; feet blackish. Wing, 2.00–2.35; tail, 1.45–1.70; culmen, .70–.90. *Sexes alike in color.* Young similar to the adult, but with the plumage duller, the rump more extensively tinged with rufous and the forehead washed with rusty.

With very numerous specimens before me, representing various localities, from Eastern Mexico to Guayaquil, Ecuador, I am unable to discover any differences coincident with locality, even in specimens from the most remote districts. There is a considerable range of individual variation, involving the amount of blackness of the maxilla (some specimens having the upper mandible wholly blackish except the extreme base, while in others only the end is dark-colored), length of wing and bill, etc. These differences, however, appear to be purely individual, and not at all, so far as I can see, local.—R. R.

The occurrence of this species within our limits was noted in the Bulletin of the Nuttall Ornithological Club, vol. i, p. 88. I have nothing to add to the brief note there published. The specimen was captured by a soldier and brought to me. After describing the bird, I returned it to him, as he wished to keep it, but it escaped in a day or two.

Found from Southern Texas to Ecuador.

125. *Amazilia yucatanensis.

Trochilus yucatanensis, CABOT, Pr. Boston Soc. N. H. 1845, 74. (Yucatan.)

Amazilia yucatanensis, GOULD, Monog. Trochilid. V, 1853, pl. 308.—MULS., Hist. Nat. Ois. Mouch. I, ——, 295.

Pyrrhophæna yucatanensis, GOULD, Introd. Troch. 1861, 157.

Eranna yucatanensis, HEINE, J. f. O. 1863, 187 (Yucatan).

Amazilius cerviniventris, GOULD, P. Z. S. June 10, 1856, 150 (Cordova, Mexico).—SCL., *ib.* 287 (Cordova); 1857, 17.

Amazilia cerviniventris, GOULD, Monog. Troch. V, 1853, pl. 319 (Cordova).—SCL., Catal. Am. B. 1862, 314, No. 1877 (Tlacotalpam, S. Mexico).—SCL. & SALV., Nom. Neotr. 1873, 92 (Mexico).—BOUCARD, Catal. Avium, 1876, 350, No. 10,966 (Yucatan).—MERRILL, Bull. Nutt. Orn. Club, II, Jan. 1877, 26 (Fort Brown, Texas, Aug. 17, 1876).—COUES & SENNETT, Bull. U. S. Geol. & Geog. Surv. Terr. vol. iv, No. 1, Feb. 1878, 35 (Brownsville, Texas).

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Pyrrhophæna cerviniventris, CABAN. & HEINE, Mus. Hein. III, 1860, 36 (note).—GOULD, Introd. Trochilid. 1861, 157 (Cordova).
Eranna cerviniventris, HEINE, J. f. O. 1863, 187 (Cordova).
Polytmus cerviniventris, GRAY, Hand-list, I, 1869, 132, No. 1079 (Mexico.—Subg. *Amazili*).

SP. CH.—Above metallic grass-green, varying to golden-green, duller on the crown and more bronzy on the upper tail-coverts, which are sometimes slightly tinged on the edges with rufous. Tail cinnamon-rufous, the intermediæ more or less glossed with greenish-bronze (sometimes entirely of this color); the other feathers bronze terminally, this color usually following the edge for a greater or less distance from the tip. Wing-coverts metallic grass-green, like the back; remainder of the wing uniform brownish-slate, with a very faint violet-purple gloss in certain lights. Throat, jugulum, and sides of the head and breast brilliant metallic-green, almost emerald in certain lights, the feathers dull white beneath the surface, thus breaking the continuity of the green, especially on the throat, where the feathers are broadly tipped with green. Rest of lower parts pale fawn-color, or dilute cinnamon-buff, deepest on the crissum; sides glossed with bronze-green; anal tufts and thighs cottony-white. Bill reddish (light brown in the dried skin), the terminal third blackish. Feet dusky. Wing, 2.15–2.20; tail, 1.50–1.60, depth of its fork about 0.20; culmen, 0.80. *Sexes alike in coloration.*

HAB.—Eastern Mexico, from the Rio Grande Valley (United States side) to Yucatan.

The two examples in the National Collection (No. 24,873, Jalapa, and 70,949, Fort Brown, Texas) differ in some minor details of coloration Thus, the former has the middle pair of tail-feathers entirely greenish-bronze, except a very small space on each web concealed by the longer upper tail-coverts; the bronzy ends of the other feathers are distinctly glossed with dark purple, and the outer pair of feathers have scarcely a trace of bronze at their ends. The latter specimen, on the other hand, has the basal two-thirds of the intermediæ wholly rufous, the bronzy ends of the other feathers destitute of a purple gloss, and the outer pair of feathers very distinctly tipped with bronze and edged for their whole length with a darker shade of the same color. These differences, however, are doubtless only individual, or, possibly, sexual. The Fort Brown specimen is a little the larger, but the difference in size is very slight. Neither has the sex marked.

I have not seen a specimen of the so-called "*yucatanensis*, Cabot", but follow Mr. Elliot (MSS.) in considering it the same as the bird afterwards described by Mr. Gould as *cerviniventris*.—R. R.

This Hummer, also new to the avifauna of the United States, and heretofore known only from Mexico, was first taken on the 17th of August, 1876, and its capture noted in the Bulletin of January, 1877, p. 26. It proves to be an abundant summer visitor, and I have nowhere found

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it so abundant as on the military reservation at Fort Brown. Here it seems perfectly at home among the dense, tangled thickets, darting rapidly among the bushes and creeping vines, and is with difficulty obtained. A rather noisy bird, its shrill cries usually first attract one's attention to its presence. A Hummer's nest, undoubtedly made by this species, was found in September, 1877, within the fort. It was placed on the fork of a dead, drooping twig of a small tree on the edge of a path through a thicket: it was about seven feet from the ground, and contained the shrivelled body of a young bird. The nest is made of the downy blossoms of the tree on which it is placed, bound on the outside with cobwebs, and rather sparingly covered with lichens. Internally, it is somewhat less than one inch in depth by one-half inch in diameter. The external depth is one and one-half inch.

NOTE.—Besides these two species of Hummers actually taken, I have seen two others that are certainly new to our avifauna, but have not been able to capture them. One of these is a large, green species, with a long tail; the other, a very small bird, of a deep purplish-brown color.

126. Geococcyx californianus, (Less.)

This curious bird is abundant, and is a resident. Its food consists of insects, field-mice, small snakes, and snails. Of these latter, one species (a variety of *Bulimulus alternatus*) is very common, passing the dry season on bushes and cacti, and of this the bird is very fond. Quite large piles of the broken shells are constantly to be seen along the roadsides about some fallen branch on which the bird breaks them. As a rule, the "road-runner" is a silent bird, but occasionally it is heard to utter one of two notes. One is a "*kook-kook-kook-kook*", much like the call of the Yellow-billed Cuckoo, but louder, and usually heard during the breeding season. The other is a note of alarm or anger: it is a low, growling sound, accompanied by a chattering of the bill. The nests are usually placed in low, thorny bushes, and are thick, clumsy structures, with but a slight depression for the eggs. The latter appear to be deposited at intervals of several days, and a perfectly fresh egg is often found with one on the point of hatching. I have never found more than four eggs or young in one nest.—(DRESSER, Ibis, 1865, 466.—SENNETT, B. Rio Grande, 36.)

127. *Coccyzus americanus, (Linn.)

Not uncommon summer visitor; breeding rather plentifully.—(DRESSER, Ibis, 1865, 467.—SENNETT, B. Rio Grande, 38.)

128. *Picus scalaris, Wagler.

Common resident. In notes and habits, this little bird is so like the Downy Woodpecker that there is little to be said about it. Eighteen perfectly identified eggs now before me average .81 by .64, which is much less than the measurements given in Baird, Brewer, and Ridgway, II, 519.—(DRESSER, Ibis, 1865, 468.—SENNETT, B. Rio Grande, 38.)

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129. Hylotomus pileatus, (Linn.)

Late in May, 1876, I saw one specimen near Santa Maria, and have seen several holes that from their size were probably made by this bird.*—(DRESSER, Ibis, 1865, 469.)

MEM.—Perhaps this was a Mexican species.

130. * Centurus aurifrons, (Wagl.)

This handsome Woodpecker is found abundantly, perhaps rather more so than *P. scalaris*. Its habits and mode of nesting do not differ from those of other Woodpeckers of the same size. In places where there is only low chaparral, the poles of the government telegraph line are completely riddled by this bird. The eggs are usually four in number, and are rather fragile; before they are blown, they are a beautiful shade of pink. Seven specimens average 1.03 by .76.—(SENNETT, B. Rio Grande, 39.—*C. flaviventris*, DRESSER, Ibis, 1865, 469.)

131. Strix flammea *var.* pratincola, Bon.

This Owl seems to be a rather common resident. Near Hidalgo it breeds in holes in the banks of the Rio Grande, and in Brownsville a few nest in ruined buildings.—(*S. pratincola*, DRESSER, Ibis, 1865, 330.—*S. flammea americana*, SENNETT, B. Rio Grande, 39.)

132. Asio accipitrinus, (Pall.)

During the latter part of January, 1877, a small gathering of these Owls frequented a patch of tall grass in an open field near Brownsville.—(*Brachyotus cassini*, DRESSER, Ibis, 1865, 330.)

133. Scops asio *var.* maccalli, Cass.

Common resident. Near Hidalgo, on May 6, 1876, I captured a female of this race on her nest in an old hollow stump about five feet from the ground. There were two eggs, nearly hatched, placed on a few chips at the bottom of the hole: these were of a dull white color with yellowish stains, and measure 1.40 by 1.15 and 1.39 by 1.13. The parent made an interesting pet for a few days, but finally escaped from my tent with one of the pegs to which it had been tied.—(*S. asio maccalli*, SENNETT, B. Rio Grande, 39.—*S. maccalli*, DRESSER, Ibis, 1865, 330.)

134. Bubo virginianus, (Gmel.)

Probably resident. I have seen them occasionally in deep woods, and on one occasion in a perfectly open prairie, miles from timber of any size.—(SENNETT, B. Rio Grande, 39.)

135. Speotyto cunicularia *var.* hypogæa, (Bon.)

The Burrowing Owl is rather abundant during the winter months, but I do not think that any remain to breed.—(*Athene hypogæa*, DRESSER, Ibis, 1865, 330.)

* This may possibly have been the Mexican species *H. scapularis* (Vigors).—R. R.

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136. Falco communis *var.* nævius, Gmel.

Rather common on the prairies near the coast during winter.—(*F. anatum*, DRESSER, Ibis, 1865, 323.)

137. Falco fusco-cærulescens, Vieill.

Until recently but two specimens of this beautiful Falcon had been taken within the United States, one in New Mexico, the other in Texas.

During 1876 and 1877, I had occasionally seen a Hawk that I felt confident was of this species, but did not succeed in obtaining any specimens.

On the 16th of June of the latter year, I found a nest placed in the top of a low Spanish bayonet growing in Palo Alto prairie, about seven miles from Fort Brown. After waiting a long time, I wounded the female, but she sailed off over the prairie and went down among some tall grass, where she could not be found: the male did not come within gunshot, though he twice rose from the nest on my approach. The nest was a slightly depressed platform of twigs, with a little grass for lining. The eggs, three in number, were rotten, though containing well-developed embryoes. They measure 1.81 by 1.29, 1.77 by 1.33, and 1.88 by 1.33 respectively. This set is now in Dr. Brewer's collection.

On May 7, 1878, a second nest was found within one hundred yards of the one just mentioned, and the parent secured. The nest in situation and construction was precisely like the other, except that the yucca was higher, the top being about twelve feet from the ground. The eggs were three in number, all well advanced but one, with a dead embryo. They measure 1.78 by 1.34, 1.82 by 1.29, 1.73 by 1.32; the ground-color is white, but so thickly dotted with reddish-brown as to appear of that color; over these are somewhat heavier markings of deeper shades of brown.

A single egg, without history, sent to me from Hidalgo, Texas, by Dr. S. M. Finley, U. S. A., measures 1.73 by 1.36: it is probably of this species, but its general appearance is much more reddish than either of the above sets.

Since becoming more familiar with the habits of this Falcon, I have several times observed it among yuccas and prickly pears on open prairies, and it is probably a not very uncommon summer resident in such places in this vicinity.

NOTE.—The egg referred to by Dr. Merrill as without history presents a very interesting problem, only to be solved when eggs precisely similar can be found with their parentage satisfactorily established. It may be an egg of *femoralis*, but is quite as likely to be something else. It resembles in the color and peculiarities of its markings no eggs of the *femoralis* I have ever seen. It has neither the beautiful vandyke-brown markings of the egg figured in my Oölogy, nor any of the more abundant raw-sienna dottings found in both the speci-

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mens from the Pampas, and which is the only color present in the specimens identified by Dr. M. Instead, it is marked all over its surface with handsome spots and blotches of a deep reddish-buff, almost cinnamon in shade, completely obscuring the ground. Excepting in size, it most resembles an egg of *Hierofalco islandicus*.—T. M. B.

138. Falco columbarius, Linn.

Not uncommon during winter.—(DRESSER, Ibis, 1865, 323.—SENNETT, B. Rio Grande, 42.)

139. Falco sparverius, Linn.

Abundant from about the middle of September until the early part of April. All the specimens obtained were var. *sparverius*.—(SENNETT, B. Rio Grande, 42.—*Tinnunculus s.*, DRESSER, Ibis, 1865, 323.)

140. *Polyborus cheriway, (Jacq.)

A common resident, but more abundant in winter than in summer. This seems to be due to a partial migration, from the north, of birds in immature plumage, for the number of mature individuals does not seem to vary. I do not think that the perfect plumage is acquired for at least two years. I have but little to add to the many accounts already given of this bird, except to say that, at times at least, it is more active than some of the descriptions would lead one to infer. I have seen a Caracara chase a jackass-rabbit for some distance through open mesquite chaparral, and while they were in sight the bird kept within a few feet of the animal and constantly gained on it, in spite of its sharp turns and bounds. If one bird has caught a snake or field-mouse, its companions that may happen to see it at once pursue, and a chase follows very different from what is seen among true Vultures. The nests are bulky platforms of small branches, with a slight depression lined with fine twigs, roots, and grasses, or sometimes altogether without lining: they are placed in trees or on the tops of bushes, at no great height from the ground. Both sexes incubate. I have not found more than two eggs in one nest, and these are laid at an interval of three or four days. Eleven eggs average 2.28 by 1.84. The ground-color is a deep chocolate or reddish-brown, more or less thickly covered with several darker shades of the same.—(*P. tharus*, DRESSER, Ibis, 1865, 329.—*P. tharus audubonii*, SENNETT, B. Rio Grande, 42.)

141. Elanoides forficatus, (Linn.)

This beautiful bird I have observed on but few occasions, and do not think that it breeds in this immediate vicinity. Nothing can be more graceful than its movements when pursuing insects, and for such a large bird it is very active.—(SENNETT, B. Rio Grande, 42.—*Nauclerus furcatus*, DRESSER, Ibis, 1865, 325.)

142. Elanus leucurus, (Vieill.)

Seen on a few occasions, but is rare.

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143. Circus hudsonius, (Linn.)

Probably the most common species of Hawk during the winter months, arriving in September and leaving in April. A large proportion are in immature plumage.—(DRESSER, Ibis, 1865, 328.—*C. cyaneus hudsonius*, SENNETT, B. Rio Grande, 40.)

144. Nisus fuscus, (Gmel.)

Found sparingly in winter.—(*Accipiter f.*, DRESSER, Ibis, 1865, 324.)

145. Nisus cooperi, (Bon.)

Like the last.—(*Accipiter c.*, DRESSER, Ibis, 1865, 323.—SENNETT, B. Rio Grande, 42.)

146. Antenor unicinctus *var.* harrisi, (Aud.)

Resident and quite abundant. In its habits, this bird resembles the Caracara Eagle, but is not so active. The nests are hardly distinguishable in situation or construction, and the two eggs are also deposited at an interval of three or four days. Six eggs average 2.08 by 1.62; they are dull bluish or yellowish-white, faintly stained with yellowish-brown.—(*Craxirex unicinctus*, DRESSER, Ibis, 1865, 329.—*Buteo unicinctus harrisi*, SENNETT, B. Rio Grande, 42.)

147. Buteo pennsylvanicus, (Wils.)

Uncommon winter visitor.—(DRESSER, Ibis, 1865, 325.—SENNETT, B. Rio Grande, 43.)

148. Buteo swainsoni, Bon.

Occurs sparingly in winter.—(DRESSER, Ibis, 1865, 324.)

149. Buteo borealis, (Gmel.)

A pair seen January 10, 1877, near Fort Brown, seemed to approach var. *krideri* in the extent and purity of white beneath, although the subterminal band of black on the tail was very distinct. The birds sailed several times quite near me, and I had a very good view of them.—(DRESSER, Ibis, 1865, 324.)

150. Buteo harlani, Aud.

Early in November, 1876, I observed a single specimen of this species sailing in easy circles at no great distance from the ground; but, not having my gun, I was unable to secure it.—(DRESSER, Ibis, 1865, 324.)

151. Buteo albicaudatus.—The White-tailed Buzzard.

Aquila coliblanca, AZARA, Apunt. I, 1803, 69.

Buteo albicaudatus, VIEILL., Nouv. Dict. IV, 1816, 477 (*ex* AZARA, *l. c.*).—STRICKL., Orn. Syn. I, 1855, 35.—SALVIN, P. Z. S. 1870, 215 (Veragua).

Tachytriorchis albicaudatus, SHARPE, Cat. Acc. Brit. Mus. I, 1874, 162.

Craxirex albicaudatus, RIDGW., Pr. Ac. Nat. Sci. Phila. 1875, 92.

Buteo (Craxirex) albicaudatus, RIDGW., *t. c.* 98 (monographic).

Spizaëtus leucurus, VIEILL., Nouv. Dict. XXXII, 1819, 59.

Buteo leucurus, LAFR., Rev. Zool. 1849, 100.

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Falco pterocles, TEMM., Pl. Col. I, 1823, pls. 56 (*adult*) and 139 (*young*).

Buteo pterocles, LESS., Man. I, 1828, 103.—GRAY, Gen. B. I, 1849, 12; Handlist, I, 1869, 8.—CABAN., in Schomb. Guiana, III, 1848, 739.—KAUP, Contr. Orn. 1850, 75 (subgen. *Tachytriorchis*).—BURM., Th. Bras. II, 1855, 49.—SCHLEG., Mus. P.-B. Buteones, 1863, 13; Rev. Acc. 1873, 110.—PELZ., Orn. Bras. 1871, 3, 396.—SCL. & SALV. P. Z. S. 1870, 782 (Andes of Merida, Venezuela); Nom. Neotr. 1873, 119 (Mexico to Brazil).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 41 (Tapana, S. Mexico, July).*

Tachytriorchis pterocles, KAUP, Säug. Vög. 1844, 123.—BONAP., Consp. I, 1850, 17.

Buteo albicauda, LESS., Traité, 1831, 81, pl. 15, fig. 2.—PUCHÉRAN, Rev. et Mag. Zool. 1850, 214.

Buteo tricolor, HARTL., Ind. Azara, 1847, 1 (*nec* D'ORB.)

"Buteo erythronotus", SCL., P. Z. S. 1859, 389 (Oaxaca) (*nec* King).—SALVIN & SCL., Ibis, 1860, 401 (Antioquia, Guatemala.)—LAWR., Ann. Lyc. N. Y. IX, 1868, 133 (San José and San Antonio, Costa Rica).

"Buteo harlani" (supposed young), SHARPE, Cat. Acc. Brit. Mus. I, 1874, 191 (= *juv.*†).

HAB.—The whole of Middle America, north to the Lower Rio Grande Valley in Texas (on the eastern side), Colima (west coast), and the City of Mexico (central plateau); Eastern South America as far as Paraguay.

Diagnosis.—Wing, 14.50–18.00; tail, 7.70–10.50; culmen, .95–1.05; tarsus, 3.30–3.70; middle toe, 1.55–1.80. Form: Third quill longest; first intermediate between sixth and eighth. Tail even in adult, slightly rounded in young. Color: Adult, tail white (the lateral feathers much tinged with ash), crossed by a broad subterminal band of black; the white portion crossed by faint lines or narrow bars of plumbeous. Above dark plumbeous; rump and lower parts pure white; throat plumbeous-black or bluish-plumbeous. Flanks, rump, and lining of the wing usually faintly barred with ashy, dusky, or rufous. ♂: Lesser wing-coverts with a restricted patch of rufous on the anterior portion; longer scapulars strongly tinged with rufous. ♀: Rufous patch on lesser wing-covert region extended over nearly the whole of its area; longer scapulars scarcely tinged with rufous. Young: Tail hoary-grayish (the inner webs mostly white), growing gradually darker terminally, and passing narrowly into dull whitish or rufous at tip; crossed by numerous narrow and very indistinct bars of darker, these growing gradually obsolete towards the base.‡ General color brownish-black, the lower parts more or less variegated (most conspicuously on the posterior portions and on middle of the breast) with ochraceous or whitish.

Remarks.—The identity of specimens of the two plumages described in the diagnosis as "adult" and "young" is proven by specimens in which part of the tail-feathers are of one plumage and part of the other. Such a specimen is in Mr. Lawrence's collection from the City of Mexico.

The older individuals in the immature dress are colored as follows:—Tail hoary ash, growing darker terminally, and passing narrowly into

* Iris hazel-brown; cere greenish; feet yellow.

† *Fide* SALVIN, Ibis, October, 1874, 314.

‡ These bars are sometimes entirely obsolete on the outer webs.

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brownish-white at the tip—the inner webs mostly white; the terminal half with just discernible obscure bars of darker, these becoming gradually obsolete on the basal half; sometimes they are entirely obsolete for the full length of the outer webs. Upper tail-coverts pure white, usually immaculate, but sometimes barred; inner webs of primaries ashy, the two or three outer ones more whitish, and sometimes barred with dusky. In males, the middle of the breast, the tibiæ, and crissum are usually ochraceous, irregularly spotted with brownish-black.

The darker-colored individuals in this stage are distinguishable from the dark examples of the young of *B. swainsoni* only by the very much stouter and longer tarsi.

The adults vary but little. The white of the jugulum usually reaches forward medially into the plumbeous of the throat, and in one (♂ ad., Tehuantepec, Mexico; Sumichrast) it extends—interruptedly, however—to the chin. Another male from the same locality has the scapulars almost entirely rufous, with black shaft-streaks. The white of the lower parts in the adult is of a pureness and continuity strikingly characteristic of this species.

A very young specimen from Paraguay has the tail more brownish, more distinctly barred, and more ochraceous on the tip; the upper tail-coverts are ochraceous, marked with broad crescentic bars of blackish, and the upper parts generally are variegated with ochraceous.

The specimen collected by Dr. Merrill (No. 74,464) is an adult male in fine plumage. It agrees strictly with Mexican examples of corresponding sex and age. Dr. M. furnishes the following notes on this specimen:—"Length, 19.20; extent, 47.40; wing, 15.30; tail, 7.20. Feet and legs yellow; cere greenish yellow; tip of bill dark, basal half bluish green; iris brown."

Material examined.—United States National Museum, 13; Museum of the Academy of Natural Sciences of Philadelphia, 6; Museum of G. N. Lawrence, Esq., 1; other specimens,* 4. Total number of specimens examined, 24.

Measurements.

Sex and age.	Wing.	Tail.	Culmen.	Tarsus.	Middle toe.	Specimens.
♂ ad.	16.30—16.70	7.50— 9.00	.95—1.10	3.30—3.55	1.60—1.80	5
♂ juv.	14.50—16.75	8.60— 8.75	1.02—....	3.30—3.60	1.55—1.65	3
♀ ad.	17.75—	8.25—.....	1.00—....	3.60—....	1.75—....	1
♀ juv.	17.00—17.75	8.40—10.30	.95—1 05	3.30—3.70	1.60—1.80	3

This fine Hawk is a rather common resident on the extensive prairies near the coast, especially about the sand ridges that are covered with yucca and cactus. Its habits appear to be like those of the allied species of Prairie Hawks. On the 2d of May, 1878, I found two nests, each

* These are specimens collected on the Isthmus of Tehuantepec by Prof. F. Sumichrast, and not entered in the Register of the National Museum.

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placed in the top of a yucca growing in Palo Alto prairie, about seven miles from the fort. The nests were not more than eight feet from the ground, and were good-sized platforms of twigs, with scarcely any lining. While examining these nests, the parents sailed in circles overhead, constantly uttering a cry much like the bleating of a goat. Each nest contained one egg. The first was quite fresh, and measures 2.35 by 1.91. It is of a dirty-white color, with a few reddish blotches at the smaller end. The second egg was partly incubated. It resembles the first one, but the reddish blotches are rather sparsely distributed over the entire egg. It measures 2.35 by 1.85.

152. Rhinogryphus aura, (Linn.)

Very common at all seasons. Deposits its eggs on the ground, sometimes on the open prairie; at others, in more or less dense chaparral.* —(*Cathartes a.*, DRESSER, Ibis, 1865, 322.—SENNETT, B. Rio Grande, 44.)

153. Catharistes atratus, (Bart.)

About as common as the preceding species, and, like it, breeds on the ground. I have not heard of either species building in trees here, as they are said to do in other parts of Texas.—(*Cathartes a.*, DRESSER, Ibis, 1865, 322.—SENNETT, B. Rio Grande, 45.)

154. Columba flavirostris, Wagl.

This large and handsome Pigeon is found in abundance during the summer months, arriving in flocks of fifteen or twenty about the last week in February. Though not very uncommon about Fort Brown, it is much more plentiful a few miles higher up the river, where the dense woods offer it the shade and retirement it seeks. Three nests found in a grove of ash-trees, on the bank of the Rio Grande, near camp at Hidalgo, were frail platforms of twigs, such as are usually built by other Pigeons. Each contained one egg. It would appear from Mr. Sennett's observations, which are more complete than mine, that this Pigeon rarely, if ever, lays more than one egg. These are of a pearly whiteness, and average 1.50 by 1.08. Both sexes incubate. A perfectly fresh specimen has the soft parts as follows:—Terminal half of bill pale horn-color; basal half light pink; margin of eyelids and a ring near its base deep pinkish-red; iris bright orange-yellow, lighter yellow at pupillary margin; legs and feet vivid purplish-red.—(DRESSER, Ibis, 1866, 23.—SENNETT, B. Rio Grande, 45.)

155. * Melopelia leucoptera, (Linn.)

Very common during the summer months. The nests as a rule are smaller and more frail than those of the Carolina Dove, and the eggs have a decided creamy tinge, which is rarely lost after blowing, at least

* I have looked carefully for *R. burrovianus*, but without success, although Mr. Dresser (Ibis, 1865, p. 322) states that he has seen it on Palo Alto prairie, not more than seven miles from the fort.

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not for months. Thirty-four eggs average 1.17 by .88; extremes 1.30 by .95 and 1.05 by .80. The note is a deep, sonorous *coo*, frequently repeated, and heard at a great distance.—(DRESSER, Ibis, 1866, 24.—SENNETT, B. Rio Grande, 47.)

156. * Zenædura carolinensis, (Linn.)

Although this species is found throughout the year, it is decidedly uncommon during the winter months; probably not more than 5 per cent. or less remain at that season. One habit noticed here I have not seen mentioned before,—that of occasionally occupying old nests of the Great-tailed Grackle for their second brood.—(DRESSER, Ibis, 1866, 24.—SENNETT, B. Rio Grande, 47.)

157. * Chamæpelia passerina, (Linn.)

Quite abundant, particularly in summer. The small and rather compact nests are placed on the horizontal branch of a stout bush or tree, and are lined with a few straws. On one occasion, I found the eggs in a roughly made nest on the ground on the edge of a prairie.—(DRESSER, Ibis, 1866, 24.—SENNETT, B. Rio Grande, 48.)

158. *Æchmoptila albifrons.

Z[enaida] amabilis, MCCALL, Pr. Ac. Nat. Sci. Phila. 1851, 220 (between Matamoras and Camargo).

"*Leptoptila albifrons*, GRAY, List Spec. Brit. Mus. p. 15."—BONAP., Consp. II, 1855, 74.—SCL., P. Z. S. 1859, 363 (Jalapa); 1860, 289 (Babahoyo, Ecuador); 1864, 178 (City of Mexico); 1870, 838 (Honduras).—SCL. & SALV., Ibis, 1859, 222 (Dueñas, Guatemala); P. Z. S 1864, 370 (Guatemala; Panama); 1868, 60 (Mexico; Guatemala); 1870, 838 (coast of Honduras); Nom. Neotr. 1873, 133.—LAWR., Pr. Boston Soc. 1871, — (Tres Marias Islands, W. Mexico; common. Vulg.: "*Paloma*"); Mem. Boston Soc. II, 1874, 305 (Mazatlan; Tres Marias; habits); Bull. U. S. Nat. Mus. No. 4, 1876, 44 (Isth. Tehuantepec. "Iris orange; bill black; bare orbital space bluish; feet carmine").—COUES, Bull. Nutt. Orn. Club, II, July, 1877, 82 (Hidalgo, Texas, April 18, 1877; not uncommon; breeding).

Æchmoptila albifrons, COUES & SENNETT, Bull. U. S. Geol. and Geog. Surv. Terr. vol. iv, No. 1, 1878, 49 (Hidalgo, Texas).

Peristera albifrons, BONAP., Consp. II, 1855, 74 (Mexico; "Cuba"; "Columbia"; "Carthagena").—GRAY, Hand-list, II, 1870, 242 (Mexico. Subg. *Leptotila*).

"*Peristera brachyptera*, GRAY, MSS." (SCLATER).

[A good description of this species having already been given by Dr. Coues in Mr. Sennett's paper, I give here only a list of references, mostly additional to those already published.—R. R.]

This Pigeon is not rare in the vicinity of Fort Brown, but is shy and not very often seen. I can give nothing very definite in regard to its habits. The only nest I have found was taken on June 8, 1878, on the government reservation. It was about seven feet from the ground, supported by the dense interlacing tendrils of a hanging vine growing on the edge of a thicket. The eggs, two in number, were quite fresh.

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They measure 1.16 by .86 and 1.19 by .89. They are much like eggs of *M. leucoptera*, but have a strong olive-buff instead of a creamy-buff tinge.

159. Ortalida vetula *var.* maccalli, Baird.

The Chachalac, as the present species is called on the Lower Rio Grande, is one of the most characteristic birds of that region. Rarely seen at any distance from woods or dense chaparral, they are abundant in those places, and their hoarse cries are the first thing heard by the traveller on awaking in the morning. During the day, unless rainy or cloudy, the birds are rarely seen or heard; but shortly before sunrise and sunset, they mount to the topmost branch of a dead tree, and make the woods ring with their discordant notes. Contrary to almost every description of their cry I have seen, it consists of three syllables, though occasionally a fourth is added. When one bird begins to cry, the nearest bird joins in at the second note, and in this way the fourth syllable is made; but they keep such good time that it is often very difficult to satisfy one's self that this is the fact. I cannot say certainly whether the female utters this cry as well as the male, but there is a well-marked anatomical distinction in the sexes in regard to the development of the trachea. In the male, this passes down outside the pectoral muscles, beneath the skin, to within about one inch of the end of the sternum; it then doubles on itself, and passes up, still on the right of the keel, to descend within the thorax in the usual manner. This duplicature is wanting in the female. These birds are much hunted for the Brownsville market, though their flesh is not particularly good, and the body is very small for the apparent size of the bird. Easily domesticated, they become troublesomely familiar, and are decided nuisances when kept about a house. Beyond Ringgold Barracks, this species is said to become rare, and soon to disappear; and it probably does not pass more than fifty miles to the north of the Rio Grande. The nests are shallow structures, often made entirely of Spanish moss, and are placed on horizontal limbs a few feet from the ground. The eggs, commonly three in number, are about the size and shape of common hens' eggs; they are of a buffy-white, and are roughly granulated; they average about 2.18 by 1.55.—(*O. maccalli*, DRESSER, Ibis, 1866, 24.—*O. vetula*, SENNETT, B. Rio Grande, 50.)

160. Meleagris gallopavo, Linn.

Found in abundance in all suitable localities, but not in the immediate vicinity of the fort; birds taken here present the characters of var. *mexicana* well developed. Two eggs taken near Hidalgo by Mr. G. B. Sennett, and presented to me, are quite unlike; one measures 2.41 by 1.84, and in color and markings is like a typical egg of the domestic turkey; the other egg, 2.33 by 1.72, is of a pale creamy-white, the spots being few and very pale.—(DRESSER, Ibis, 1866, 25.—SENNETT, B. Rio Grande, 53.)

161. Cupidonia cupido *var.* pallidicincta, Ridgw.

I am informed by a person perfectly familiar with the bird that the Prairie Chicken is occasionally seen on the prairies about Miradores

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ranch, which is about thirty miles north of the fort and a few miles from the coast. This is probably about the southernmost point in the range of the bird.—(*C. cupido*, DRESSER, Ibis, 1866, 26.)

162. *Ortyx virginiana *var.* texana, Lawr.

The Texan Quail is very common, and in its habits resembles the Eastern Quail in all respects, except that it does not lie well to a dog. They are with difficulty flushed, but run at once into chaparral, from which it is almost impossible to dislodge them. The only nest I succeeded in finding was at the foot of a small stump, surrounded by a small, but dense, growth of offshoots; the nest was rather elaborately built of grasses, and was well domed. On the 21st of May, it contained sixteen fresh eggs. These average 1.15 by .93, the extremes being 1.18 by .95 and 1.12 by .92. Four odd eggs from different nests are rather larger than this average.—(*O. texanus*, DRESSER, Ibis, 1866, 27.—*O. virginiana texana*, SENNETT, B. Rio Grande, 53.)

163. Callipepla squamata, (Vigors.)

This beautiful Partridge is found in great abundance at Ringgold Barracks about 120 miles from Fort Brown, but does not come very much farther down the river. Hidalgo is about the limit of their range in this direction, though on September 13, 1877, I killed one within two miles of the fort. This was one of a covey and the only one flushed, and I did not recognize it until I picked it up; the others were not distinctly seen, but were probably of the same species.—(DRESSER, Ibis, 1866, 28.)

164. Ægialitis vocifera, (Linn.)

Common resident.—(DRESSER, Ibis, 1866, 33.—SENNETT, B. Rio Grande, 53.)

165. Ægialitis wilsonia, (Ord.)

Resident, breeding rather abundantly along the coast.—(DRESSER, Ibis, 1866, 34.)

166. Hæmatopus palliatus, Temm.

Breeds on Padre and Brazos Islands.—(DRESSER, Ibis, 1866, 34.—SENNETT, B. Rio Grande, 53.)

167. Strepsilas interpres, (Linn.)

The Turnstone is found on the coast and adjacent lagoons throughout the year, and I feel confident that it breeds in spite of the latitude. During May and June pairs in full plumage may daily be seen in the same localities.—(DRESSER, Ibis, 1866, 34.—SENNETT, B. Rio Grande, 54.)

168. Recurvirostra americana, Gm.

Common during winter, a few pairs remaining to breed.—(DRESSER, Ibis, 1866, 35.—SENNETT, B. Rio Grande, 54.)

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169. Himantopus mexicanus, (Müller.)

Common resident. Breeds in the marshes about the middle of May, making its nests on wet grassy flats and laying three or four eggs. The nests are platforms of straw and grasses, often wet, and barely keeping the eggs out of the water. Twenty-two eggs average 1.75 by 1.19, the extremes being 1.88 by 1.25 and 1.60 by 1.10.—(*H. nigricollis*, DRESSER, Ibis, 1866, 35.—SENNETT, B. Rio Grande, 54.)

170. Gallinago wilsoni, (Temm.)

Plentiful during the winter, though the great majority go farther south. The time of their arrival in the autumn is uncertain. In 1876, the first were shot on the 18th of September, and they soon became abundant; this was said to be at least a month earlier than usual. In 1877, the main flight arrived on the 28th of November, during a cold and wet "norther".—(DRESSER, Ibis, 1866, 36.)

171. Macrorhamphus griseus, (Gmel.)

Common from September until April.—(DRESSER, Ibis, 1866, 36.)

172. Tringa alpina *var.* americana, Cass.

On May 16, 1877, I found the Red-backed Sandpiper rather common about some lagoons in the salt marshes; the males were in full breeding plumage.

173. Tringa bairdii, Coues.

Two females taken March 30, 1876, on a sand-bar in the river.

174. Tringa maculata, Vieill.

Common during the migrations, returning in the latter part of July. They do not seem to pass the winter.—(DRESSER, Ibis, 1866, 36.—SENNETT, B. Rio Grande, 55.)

175. Tringa fuscicollis, Vieill.

Common in winter.

176. Triniga minutilla, Vieill.

Common in winter.—(*Tringa wilsoni*, DRESSER, Ibis, 1866, 37.)

177. Calidris arenaria, (Linn.)

Common in winter on Padre and Brazos Islands, where I have also seen it in July.

178. Ereunetes pusillus, (Linn.)

Common in winter.—(*E. petrificatus*, DRESSER, Ibis, 1866, 37.)

179. Micropalama himantopus, (Bonap.)

October 13, 1877.—(DRESSER, Ibis, 1866, 37.)

180. Actiturus bartramius, (Wils.)

This species arrives in small flocks about the second or third week in March, and is found abundantly on the grassy prairies. On its arrival

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in spring, it is in poor condition, and soon goes farther north, though a few linger until about May 10. Late in July some reappear, and by the first of September they are abundant; by the middle of this month, they begin to leave, and few are seen or heard after the first week in October.—(DRESSER, Ibis, 1866, 38.—SENNETT, B. Rio Grande, 55.)

181. Tryngites rufescens, (Vieill.)

The Buff-breasted Sandpiper is found in the same localities and at the same seasons as the Upland Plover, which it closely resembles in habits, but is much less shy and suspicious.—(DRESSER, Ibis, 1866, 39.)

182. Limosa fedoa, (Linn.)

Taken in spring and autumn.—(DRESSER, Ibis, 1866, 39.—SENNETT, B. Rio Grande, 55.)

183. Symphemia semipalmata, (Gmel.)

Breeds rather plentifully in suitable localities. Four eggs, somewhat advanced in incubation, were found on May 2, 1877, placed on a few grass-blades under a weed in a dry part of the marsh. Two of the eggs were broken by the carriage-wheel; the others measure 2.06 by 1.52 and 2.05 by 1.50. I do not think that any remain during winter.—(DRESSER, Ibis, 1866, 37.—*Totanus s.*, SENNETT, B. Rio Grande, 55.)

184. Gambetta melanoleuca, (Gmel.)

Abundant during the migrations, many passing the winter here.—(DRESSER, Ibis, 1866, 38.—SENNETT, B. Rio Grande, 55.)

185. Gambetta flavipes, (Gmel.)

Like the last, but perhaps less common in winter.—(DRESSER, Ibis, 1866, 38.)

186. Numenius longirostris, Wils.

Common during winter, many remaining to breed on the partially dry marshes near the coast. Found recently fledged young June 16.—(DRESSER, Ibis, 1866, 40.—SENNETT, B. Rio Grande, 55.)

187. Numenius borealis, (Forst.)

Common during the migrations, some passing the winter.—(DRESSER, Ibis, 1866, 40.—SENNETT, B. Rio Grande, 56.)

188. Charadrius fulvus *var.* virginicus, Borck.

Not rare in winter.—(*C. virginicus*, DRESSER, Ibis, 1866, 33.)

189. Tringoides macularius, (Linn.)

Rather rare in winter.—(DRESSER, Ibis, 1866, 38.)

190. Tantalus loculator, Linn.

On the 10th of April, 1876, I saw a pair of these birds on the edge of a shallow lagoon near Fort Brown.—(DRESSER, Ibis, 1866, 32.)

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191. Plegadis guarauna, (Gm.)

Resident, but much more common in summer than in winter. On the 16th of May, 1877, Mr. G. B. Sennett and I visited a large patch of tulé-reeds growing in a shallow lagoon, about ten miles from the fort, in which large numbers of this Ibis and several kinds of Herons were breeding. The reeds covered an area of perhaps seventy-five acres or less, growing in water three or four feet in depth. Irregular channels of open water traversed the reeds here and there, but the bottom was comparatively firm, and there was little difficulty in wading in any direction. Besides the Ibises, the Great and Little White Egrets, Louisiana and Night Herons, and several other birds were breeding here. Often nests of all these species were placed within a few feet of each other, but there was a tendency towards the different kinds forming little nesting groups of ten or fifteen pairs. The reeds grew about six feet above the surface of the water, and were either beaten down to form a support for the nests, or dead and partly floating stalks of the previous year were used for that purpose.

It was impossible to estimate the number of the Ibises and different Herons nesting here. On approaching the spot, many would be seen about the edges of the lagoon or flying to or from more distant feeding grounds, but upon firing a gun a perfect mass of birds arose, with a noise like thunder, from the entire bed of reeds, soon to settle down again.

Both nests and eggs of the Ibises were quite unlike those of any of the Herons, and could be distinguished at a glance. The nests were made of broken bits of dead tulés, supported by and attached to broken and upright stalks of living ones. They were rather well and compactly built, and were usually well cupped, quite unlike the clumsy platforms of the Herons. The eggs were nearly always three in number, and at this date were far advanced in incubation; many nests contained young of all sizes. Fifty eggs now before me average 1.95 by 1.35, the extremes being 2.20 by 1.49 and 1.73 by 1.29; they are decidedly pointed at the smaller end, and are of a deep bluish-green color.

On May 7 of the following year, I revisited this heronry, but there were no nests, and very few Ibises or Herons were to be seen. I am inclined to think that they moved to some other part of the extensive prairie, in several parts of which were beds of reeds similar to the one above described, but I was prevented by sickness from making any further investigations.

The young, when first hatched, are clothed in blackish down; the bill is whitish, with dusky base. When nearly fledged, the wings and back have a very marked metallic lustre; the base of bill, with terminal one-fourth inch and a two-fifths inch median band, black; the intervening portions pinkish-white.—(*Ibis ordi*, DRESSER, Ibis, 1866, 32.—*Falcinellus g.*, SENNETT, B. Rio Grande, 56.)

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192. Ibis alba, (Linn.)

A few observed at all seasons, but I was unable to find any locality where they nested.—(DRESSER, Ibis, 166, 32.—SENNETT, B. Rio Grande, 58.)

193. Platalea ajaja, Linn.

Not rare, but more common near the coast. It must breed in the vicinity.—(DRESSER, Ibis, 1866, 33.—SENNETT, B. Rio Grande, 58.)

194. Ardea herodias, Linn.

Common resident. Found nesting abundantly on Padre Island by Mr. Sennett.—(DRESSER, Ibis, 1866, 31.—SENNETT, B. Rio Grande, 58.)

195. Herodias egretta, (Gm.)

Common resident, but more plentiful in summer. Breeds abundantly in the same locality as the preceding species. The nests, as a rule, were distinguishable by their large size; the eggs and young were also quite characteristic. Twelve eggs average 2.14 by 1.54.—(DRESSER, Ibis, 1866, 31.—SENNETT, B. Rio Grande, 59.)

196. Garzetta candidissima, (Jacq.)

Abundant during the summer, a few passing the winter. Breeds in great numbers. Its nest and eggs are only to be confounded with those of the succeeding species.—(DRESSER, Ibis, 1866, 31.—SENNETT, B. Rio Grande, 59.)

197. Hydranassa tricolor, (Müll.)

Common summer visitant. I do not think that any are found here during winter. In visiting the heronry already referred to, the Louisiana Heron was found in abundance. The birds seemed more shy in leaving their nests than the two preceding. The nests and eggs closely resembled those of the Little White Egret, and could not be positively identified without seeing the parent; but, as a rule, the nests were smaller, and the eggs a little larger and of a deeper shade.—(SENNETT, B. Rio Grande, 60.—*Demiegretta ludoviciana*, DRESSER, Ibis, 1866, 31.)

198. Dichromanassa rufa, (Bodd.)

Not uncommon during the summer. In the latter part of March, 1878, Mr. Sennett found this species breeding in large numbers on Padre Island. The nests were placed on low prickly pears or on the ground.—(SENNETT, B. Rio Grande, 60.—*Demiegretta rufa*, DRESSER, Ibis, 1866, 31.—*Demiegretta pealii*, DRESSER, Ibis, 1866, 31.)

199. Florida cærulea, (Linn.)

Seen throughout the year, but most abundantly in summer. Breeds on Padre Island.—(DRESSER, Ibis, 1866, 31.—SENNETT, B. Rio Grande, 61.)

200. Nyctiardea grisea *var.* nævia, (Bodd.)

Rather common resident, but many go farther south in winter. Found breeding with the other species among the tulés, but in fewer

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numbers. The nests differed from those of the others by twigs and small branches being generally used in their construction, which must have been brought from a considerable distance. They were but slightly above the surface of the water, and most of the nests contained nearly (fledged young.—*N. gardeni*, DRESSER, Ibis, 1866, 32.—*N. nævia*, SENNETT, B. Rio Grande, 61.)

201. Nycherodius violaceus, (Linn.)

Rather uncommon. Probably breeds at no great distance, but I found no nests.—(DRESSER, Ibis, 1866, 32.—SENNETT, B. Rio Grande, 61.)

202. *Butorides virescens, (Linn.)

Common in summer, but rare in winter. Several pairs breed within Fort Brown, placing their nests on horizontal branches of mesquite-trees. Several sets average 1.49 by 1.15.—(DRESSER, Ibis, 1866, 32.)

203. Botaurus lentiginosus, (Montag.)

Occurs in moderate numbers during the migrations.—(DRESSER, Ibis, 1866, 32.)

204. Ardetta exilis, (Gmel.)

A few pairs were seen in the heronry already referred to. No nests were found, but the birds unquestionably breed there.—(DRESSER, Ibis, 1866, 32.—SENNETT, B. Rio Grande, 61.)

205. Grus americana, (Linn.)

Not rare, especially on the prairies near the coast. I do not think that either species of Crane breeds in this neighborhood.—(DRESSER, Ibis, 1866, 30.—SENNETT, B. Rio Grande, 61.)

206. Grus canadensis, (Linn.)

Decidedly more abundant than the White Crane during the winter months, and not so shy.—(DRESSER, Ibis, 1866, 30.)

207. Porzana carolina, (Linn.)

Common during the migrations. I am quite positive that a few pairs breed near here in suitable localities.—(DRESSER, Ibis, 1866, 40.)

208. Gallinula galeata, (Licht.)

Parents and eggs obtained on the 16th of May among beds of reeds.—(SENNETT, B. Rio Grande, 61.)

209. Ionornis martinica, (Linn.)

Doubtless breeds, for I have taken young birds in September that were scarcely able to fly.—(DRESSER, Ibis, 1866, 41.)

210. Fulica americana, Gm.

Very common resident. Breeds among patches of tulés, making a rather bulky platform of bits of dead reeds scarcely raised above the surface of the water. Fourteen is the greatest number of eggs I have found in one nest.—(DRESSER, Ibis, 1866, 40.—SENNETT, B. Rio Grande, 62.)

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Family PARRIDÆ: The JACANAS.

Parridæ, "SELYS, 1842".—GRAY, Hand-list, III, 1871, 69.—SCL. & SALV., Nom. Neotr. 1873, viii, 142.—BOUCARD, Cat. Av. 1876, IX, 11.

< *Rallidæ*, VIGORS (*fide* GRAY).—LILLJEBORG, P. Z. S. 1866, 17.

= *Parrinæ*, GRAY, List Genera B. 1840, —; 2d ed. 1841, 91 (< *Palamedeidæ*).—GRAY & MITCH., Genera B. 4to, III, 1849, 588 (< *Palamedeidæ*); Genera and Subg. 1855, 119 (< *Palamedeidæ*).—LILLJEBORG, P. Z. S. 1866, 17 (< *Rallidæ*).

< *Palamedeidæ*, GRAY, *l. c.*

< *Gallinulidæ*, BLAS. (*fide* GRAY).

CH.—Small-sized wading birds, combining the general appearance of Rails and Plovers, but differing from either in the remarkable and excessive elongation of the toes and claws, the latter nearly straight and much compressed, that of the hallux much longer than its digit and slightly recurved.

The above brief diagnosis is sufficient to distinguish the Jacanas from all other wading birds. Their nearest allies appear to be the Plovers, from which they differ chiefly in the character of the feet, as pointed out above. The single American genus *Parra*, Lath., is further characterized by the presence of leaf-like lobes at the base of the bill, and a sharp, conical spur projecting from the inside of the bend of the wing, in the possession of which features they present a striking analogy to certain Plovers, as the genera *Lobivanellus*, Strickl., and *Hoplopterus*, Bonap. The genus *Parra*, of which there are several species, all American,* is characterized as follows:—

Genus PARRA, Linnæus.

< *Jacana*, BRISS., Orn. V, 1760, 121. Type, *Parra jacana*, AUCT. (Includes *Hydralector*, Wagl., and *Metopodius*, Wagl.)

< *Gallinula*, RAY (*fide* GRAY).

< *Parra*, LINN., S. N. I, 1766, 259. Type, *P. dominica*, Linn.,= *Lobivanellus brissoni*, (Wagl.)! (Includes also *Chauna* and *Jacana*.)—LATHAM, Ind. Orn. II, 1790, 762. Type, *P. jacana*, Linn. (Includes *Hydrophasianus*, Wagl., *Chauna*, Illiger, and *Metopodius*, Wagl.)—GRAY, Hand-list, III, 1871, 69 (subg. *Parra*).

= *Parra*, GRAY, List Genera, 2d ed. 1841, 91; Gen. and Subg. 1855, 119, No. 1976.—GRAY & MITCH., Genera B. III, 1849, 288.—SCL., P. Z. S. 1856, 282 (synopsis of species).—SCL. & SALV., Nom. Neotr. 1873, 142 (list of species).—BOUCARD, Cat. Av. 1876, 11 (list of species).

CH.—Remiges normal. Rectrices much abbreviated, very soft, entirely concealed by the tail-coverts. Forehead with large, leaf-like lobe, free laterally and posteriorly, adhering centrally and anteriorly; rictus ornamented by a smaller lobe (rudimentary in *P. gymnostoma*).

The above characters are chiefly those which distinguish the American genus *Parra* from its Old World allies *Hydrophasianus*,† *Metopo-*

* For a synopsis of the species of this genus, see Sclater "On the American Genus *Parra*", in Proc. Zool. Soc. Lond. 1856, p. 282.

† "*Hydrophasianus*, Wagler, 1832." Type, *H. chirurgus* (Scopoli).

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dius,* and *Hydralector*.† I am unable to state in just what essential particulars the two latter differ from *Parra*, never having seen specimens of any species of either form. The first, however, differs very widely in the great development of the rectrices, of which the intermediæ are excessively elongated; in the curious attenuation of the primaries, which are, moreover, of very unequal length, and in the entire absence of lobes about the base of the bill. These characters I have drawn from figures of the single species, *H. chirurgus* (Scopoli), not having seen the bird itself.

In addition to the generic characters given above, the following also may be mentioned:—

Bill somewhat Plover-like in form, the basal half with the upper and lower outlines nearly parallel and decidedly approximated, the terminal half of the culmen strongly convex, the gonys nearly straight, and decidedly ascending terminally; nostrils small, horizontal, elliptical, situated about half-way between the anterior angle of the eye and the tip of the bill. Primaries 10, reaching to the tips of the tertials, the three outer quills longest and nearly equal, their inner webs slightly narrowed near the end. Tarsus and bare portion of the tibia covered by a continuous frontal and posterior series of transverse scutellæ, these sometimes fused into continuous sheaths; middle toe (exclusive of its claw) about equal to the tarsus (sometimes a little shorter); outer toe equal to the middle toe, but its claw a little shorter; inner toe a little shorter than the outer, but its claw considerably longer; hallux about equal to the basal phalanx of the middle toe, but its claw reaching nearly, if not quite, to the end of the middle toe.

211. Parra gymnostoma.

Parra gymnostoma, WAGLER, Isis, 1831, 517.—SCL., P. Z. S. 1856, 283 (S. Mexico to New Granada. Diagnosis and synonymy); 1857, 206 (Jalapa).—SCL. & SALV., Ibis, 1859, 231 (Belize, Honduras; Peten, Guatemala); Nom. Neotr. 1873, 142.—TAYLOR, Ibis, 1860, 315 (Honduras).—SALVIN, Ibis, 1870, 116 (Costa Rica); P. Z. S. 1870, 218 (Costa Rica).—LAWR., Mem. Boston Soc. II, 1874, 312 (Mazatlan, Manzanillo Bay, Zacatula R., and Rio de Coahuyana, W. Mexico. Habits. Descr. nest and eggs); Bull. U. S. Nat. Mus. No. 4, 1876, 50 (Isth. Tehuantepec).—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 88 (Ft. Brown, Texas; 1 pair; August).

Parra cordifera, LESS., Rev. Zool. 1842, 135 (Acapulco. Descr. adult).—DES MURS, Icon. Orn. 1845, pl. 42.

SP. CH.—*Adult:* Wing, 4.50–5.40; culmen, 1.15–1.40; tarsus, 1.90–2.35; middle toe, 1.85–2.25.‡ Head, neck, jugulum, and extreme anterior portion of the back uniform black, with a faint silky glossy-green gloss below. Rest of the plumage mainly uniform rich purplish chestnut, with a faint purple gloss, brightest or most rufescent on the wings,

* "*Metopodius*, Wagler, 1832." Type, *Parra africana*, Lath., *fide* Gray.

† "*Hydralector*, Wagler, 1832." Type, *Parra cristata*, Vieill., *fide* Gray.

‡ Extremes of thirteen examples.

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more purplish on the back, rump, and upper tail-coverts, and of a rich dark purplish maroon shade on the breast and sides; anal region, tibiæ, and crissum duller and more grayish. Remiges (except the tertials) pale yellowish pea-green, bordered terminally with dull dusky, this border very narrow, and strictly terminal on the secondaries, but broader and involving more or less of both edges of the quills on the primaries, where it increases in extent to the outer quill, which has the entire outer web blackish; alulæ and primary coverts dull blackish. Tail-feathers uniform rich chestnut. "Iris dark brown; bill, alar spurs, and frontal leaf, bright yellow; upper base of bill bluish white, the space between it and the nasal leaf bright carmine; feet greenish" (Sumichrast, MS., *fide* Lawr., Bull. U. S. Nat. Mus. No. 4, 1876, p. 50).

Young: Frontal leaf rudimentary. Pileum grayish-brown, bordered on each side by a wide and conspicuous superciliary stripe of buffy white, extending to the occiput; below this stripe, another narrower one of black or dusky, beginning at the posterior angle of the eye and extending along the upper edge of the auriculars to the nape, which is also of this color; remainder of the head, with the entire lower parts, except the sides, continuous buffy white, more strongly tinged with buff across the jugulum. Upper parts in general (except the remiges) light grayish-brown, the feathers bordered terminally with rusty buff in the younger stage, but uniform in older individuals; rump more or less tinged with chestnut. Sides and lining of the wing dusky black, but in older examples more or less tinged with chestnut. Remiges as in the adult; rectrices grayish-brown.

The downy young is unknown, or at least if described I have been unable to find out where.

In the considerable series of specimens of this species contained in the collection of the National Museum, notable variations in size and proportions occur among specimens of the same age and sex, but apparently without regard to locality. Cuban specimens do not differ in the least from Mexican and Central American examples.

The following note was published in the Bulletin of the Nuttall Ornithological Club, vol. i, p. 88. I have nothing to add to it, except that during a recent visit to Washington Mr. Ridgway showed me some skins of this curious bird, and I was enabled to positively identify them with the birds I saw:—"Early in August (1876) I saw a pair of waterbirds quite new to me on the borders of a lagoon near Fort Brown. I was on horseback at the time, and did not have my gun, but had a good opportunity to observe them carefully. The next day I winged one of them, but it fell into a dense bed of water-plants, and could not be found, and the survivor disappeared. Respecting a letter describing the bird as seen, Mr. Ridgway writes: 'The bird you describe is undoubtedly *Parra gymnostoma;* * * * the chestnut back and yellow (greenish-yellow) wings settle the species beyond a doubt.'"

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212. Cygnus americanus, Sharpless.

Early in January, 1878, a fine specimen was brought into Brownsville alive by a Mexican, who said that it was caught on a lagoon by one of his dogs. It must have been wounded, though I could see no sign of this. Either this species or the Trumpeter Swan is said to be not uncommon near the coast during winter.

213. Anser albifrons *var.* gambeli, Hartl.

The first of the Geese to return in the autumn, usually about the first week in October. Comparatively few of this or the other species of Geese remain throughout the winter, but during the migrations this one is only surpassed in numbers by the Snow Goose. I have seen a flock of at least two hundred pass over Fort Brown as late as the 18th of April.—(*A. gambeli*, DRESSER, Ibis, 1866, 42.)

214. Chen hyperboreus, (Pall.)

Very abundant, especially on the salt prairies near the coast.—(DRESSER, Ibis, 1866, 41.—SENNETT, B. Rio Grande, 62.)

215. Branta canadensis, (Linn.)

Not rare, but the least common of the Geese in this vicinity.—(*Bernicla c.*, DRESSER, Ibis, 1866, 42.)

216. Branta hutchinsi, (Sw. & Rich.)

More abundant than *B. canadensis*, but less so than *A. gambeli*.—(*Bernicla h.*, DRESSER, Ibis, 1866, 42.)

217. Dendrocygna autumnalis, (Linn.)

This large and handsome bird arrives from the south in April, and is soon found in abundance on the river banks and lagoons. Migrating at night, it continually utters a very peculiar chattering whistle, which at once indicates its presence. Called by the Mexicans *patos maizal*, or Corn-field Duck, from its habit of frequenting those localities. It is by no means shy, and large numbers are offered for sale in the Brownsville market. Easily domesticated, it becomes very tame, roosting at night in trees with chickens and turkeys. When the females begin to lay, the males leave them, and gather in large flocks on sand-bars in the river. My knowledge of the breeding habits is derived from Dr. S. M. Finley, U. S. A., who had ample opportunity of observing these birds at Hidalgo. The eggs are deposited in hollow trees and branches, often at a considerable distance from water (two miles), and from eight to thirty feet or more from the ground. The eggs are placed on the bare wood, and are from twelve to sixteen in number. Two broods are raised, and the parent carries the young to water in her bill. Twelve eggs received from Dr. Finley average 2.11 by 1.53, with but little variation in size: they are of the usual duck shape, and in color are a rather clear yellowish-white. The birds leave in September, but a few late broods are seen as late as November. The soft parts in a full-plumaged living male were

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as follows: iris brown; bill coral-red, orange above; nail of bill bluish; legs and feet pinkish-white.—(DRESSER, Ibis, 1862, 42.—SENNETT, B. Rio Grande, 62.)

218. Dendrocygna fulva, (Gmel.)

I cannot say much in regard to this species, though it is about as common as the preceding in this vicinity. Like the Corn-field Duck, it is a summer visitant, and both species frequent the same places. The notes while flying are somewhat different. I know nothing definite in regard to the breeding habits, but they probably do not differ much from those of the other bird. Dr. Finley tells me that he did not meet with it at Hidalgo. In a fresh specimen, the bill was bluish-black; legs light slaty-blue.—(DRESSER, Ibis, 1866, 42.)

219. Anas boschas, Linn.

Not uncommon during the winter months.—(DRESSER, Ibis, 1866, 42.)

220. Anas obscura, Gm.

Not common; a few remain to breed on the marshes near the coast.—(DRESSER, Ibis, 1866, 42.—SENNETT, B. Rio Grande, 63.)

221. Dafila acuta, (Linn.)

Rather plentiful.—(DRESSER, Ibis, 1866, 43.—SENNETT, B. Rio Grande, 63.

222. Chaulelasmus streperus, (Linn.)

Probably the most common Duck in this vicinity during the winter. My game register shows that a greater number of Gadwalls were killed each winter than of any other Duck. Some remain throughout the summer.—(DRESSER, Ibis, 1866, 43.—SENNETT, B. Rio Grande, 63.)

223. Mareca americana, (Gm.)

Rather common, especially in spring and autumn.—(DRESSER, Ibis, 1866, 43.—SENNETT, B. Rio Grande, 63.)

224. Nettion carolinensis, (Gm.)

Common, especially during the migrations.—(DRESSER, Ibis, 1866, 43.)

225. Querquedula discors, (Linn.)

Common, arriving early in September. A few remain during the winter, but the great majority go farther south, returning about the middle of March.—(DRESSER, Ibis, 1866, 43.)

226. Querquedula cyanoptera, (Vieill.)

Not rare during the migrations; more are seen in spring than in autumn.

227. Spatula clypeata, (Linn.)

Very common in winter. I have seen several pairs on the marshes during the breeding season.—(SENNETT, B. Rio Grande, 63.)

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228. Fulix marila, (Linn.)

Rather rare.—(DRESSER, Ibis, 1866, 43.)

229. Fulix affinis, (Eyton.)

Decidedly more common than the last.—(DRESSER, Ibis, 1866, 43.—*Fuligula a.*, SENNETT, B. Rio Grande, 63.)

230. Fulix collaris, (Donov.)

A few specimens killed.—(DRESSER, Ibis, 1866, 43.)

231. Aythya americana, (Eyt.)

Not uncommon.—(*Æthya a.*, DRESSER, Ibis, 1866, 43.)

232. Aythya vallisneria, (Wils.)

Rarer than the last species; but few specimens shot.—(*Æthya v.*, DRESSER, Ibis, 1866, 43.)

233. Bucephala albeola, (Linn.)

Rather plentiful.—(DRESSER, Ibis, 1866, 43.)

234. Erismatura rubida, (Wils.)

Abundant.

235. Lophodytes cucullatus, (Linn.)

A few seen during winter.—(DRESSER, Ibis, 1866, 44.)

236. Pelecanus erythrorhynchus, (Gmel.)

Rather common, and seen at all seasons. I was unable to find any breeding places of this species, but they unquestionably nest near the coast, and also at no great distance from Hidalgo.—(DRESSER, Ibis, 1866, 45.—*P. trachyrhynchus*, SENNETT, B. Rio Grande, 63.)

237. Pelecanus fuscus, Linn.

Common resident. Found breeding abundantly on Padre and neighboring islands by Mr. Sennett in March, 1878.—(DRESSER, Ibis, 1866, 45.—SENNETT, B. Rio Grande, 64.)

238. Plotus anhinga, Linn.

Occasionally observed about Fort Brown, but appears to be more abundant in the lagoons higher up the river.—(DRESSER, Ibis, 1866, 45.)

239. Graculus mexicanus, (Brandt.)

Common resident. I did not find any nests, but think they are placed in the dense growth of trees and thorny bushes that borders most of the lagoons about here.—(DRESSER, Ibis, 1866, 45.—SENNETT, B. Rio Grande, 64.)

240. Larus argentatus, Gm.

Not rare along the coast in winter. One shot near Fort Brown on the 3d of March, 1877.—(SENNETT, B. Rio Grande, 64.)

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241. Larus delawarensis, Ord.

Common in winter.—(SENNETT, B. Rio Grande, 64.)

242. Chroicocephalus atricilla, (Linn.)

Common resident, breeding near the coast, and also on the salt prairies near the fort.—(DRESSER, Ibis, 1866, 44.—*Larus a.*, SENNETT, B. Rio Grande, 64.)

243. Sterna anglica, Mont.

Rather abundant. Found breeding in company with Forster's Tern.—(SENNETT, B. Rio Grande, 64.—*S. aranea*, DRESSER, Ibis, 1866, 44.)

244. Sterna caspia *var.* imperator, Coues.

Breeds on Padre Island.—(SENNETT, B. Rio Grande, 65.)

245. Sterna maxima, Bodd.

Breeds on Padre Island.—(*S. regia*, DRESSER, Ibis, 1866, 44.)

246. Sterna cantiaca, Gm.

Breeds on Padre Island.—(SENNETT, B. Rio Grande, 65.)

247. Sterna forsteri, Nutt.

On May 16, 1877, Mr. Sennett and I found a colony of these Terns nesting on a nearly submerged grassy island, among lagoons and marshes. They had but just begun to lay. About two dozen eggs were obtained, and a few parents shot for identification. The nests were slight depressions among the short grass, and the eggs were frequently wet.—(SENNETT, B. Rio Grande, 65.)

248. Sterna antillarum, (Less.)

Common in summer, and some pass the winter. Deposit their eggs on sand-bars in the river.—(*S. frenata*, DRESSER, Ibis, 1866, 44.—*S. superciliaris antillarum*, SENNETT, B. Rio Grande, 66.)

249. Hydrochelidon nigra, (Linn.)

Rather plentiful during summer.—(*H. plumbea*, DRESSER, Ibis, 1866, 45.)

250. Rhynchops nigra, Linn.

Not rare in summer.—(DRESSER, Ibis, 1866, 45.—SENNETT, B. Rio Grande, 66.)

251. Podiceps dominicus, (Linn.)

A rather common resident. Several nests, undoubtedly of this Grebe, were found on May 16, 1877, while visiting the heronry already referred to. They were made of water-plants and pieces of reeds slightly fastened to one or two tulé-stalks, and forming a wet, floating mass. No eggs were obtained.—(SENNETT, B. Rio Grande, 66.)

NOTE.—So far as it appears, Dr. Merrill's claim (Bull. N. O. C. I, 88), to have been the first to have really added this species to the North

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American fauna, must be admitted to be well founded. It was certainly "new to the American fauna", unless it had been previously ascertained to be entitled to be so ranked. Unless Dr. Gambel's attributing this bird to California be admitted, which it cannot be without confirmation, no one can properly make any such claim. The Berlandier eggs—there were no birds—are unidentified, though probably genuine, but of Mexican origin. It is also included in Dr. Coues's Birds of the Northwest, where, however, it is only given as occurring "north *to* the Rio Grande"—not "north *of* the Rio Grande". As Dr. Coues gives no authority for regarding it as known to be North American, but stops at the boundary line, the inference is that its presence was conjectural and not positive.—T. M. B.

252. Podilymbus podiceps, (Linn.)

Occurs in winter.—(DRESSER, Ibis, 1866, 46.)

AUGUST 1, 1878.

ON A NEW SERRANOID FISH, EPINEPHELUS DRUMMOND-HAYI, FROM THE BERMUDAS AND FLORIDA.

By G. BROWN GOODE and TARLETON H. BEAN.

The National Museum possesses two specimens of a Serranoid fish, apparently undescribed, for which we propose the name *Epinephelus Drummond-Hayi*, dedicating the species to Colonel H. M. Drummond Hay, C. M. Z. S., of Leggieden, Perth, Scotland, formerly of the British Army, by whom the species was first discovered at the Bermudas in 1851.

The species is easily recognized by its numerous, small, star-like, white spots on a dark ground, a type of coloration not found in any other representative of this family hitherto described.

A collection of water-color drawings, lent to the Smithsonian Institution by Colonel Drummond Hay, contains an excellent sketch of one of these fishes, which was taken by him on the outer reef of the Bermudas in 1851. This specimen weighed 52½ pounds. The drawing is on the scale of one-fifth.

The smaller specimen (No. 16,795) is fifteen and three-quarters inches long. It was received in May, 1876, from Mr. E. G. Blackford, and was for some days on exhibition in the large glass refrigerator in the Government Building on the Exhibition Grounds in Philadelphia. It was said to have been brought from Southern Florida by one of the New York market fleet. A cast of this fish was made, as well as an accurate sketch in water-colors.

A second specimen (No. 21,255) was received early in May, 1878, from Mr. Silas Stearns of Pensacola, Fla. Its length is sixteen and three-quarters inches. The following description has been prepared from these two specimens. We have seen other specimens of this species in the

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New York Aquarium, which were said to have been brought from the Bermudas. The fish belongs to the genus *Serranus* as defined by Günther, and to the genus *Epinephelus* as limited by Gill, having, in distinction from the allied genus *Trisotropis*, nine rays in the anal as well as other characters.

There is a remarkable uniformity in the measurements of the two specimens as given in tabular form below. That from Pensacola has longer fins, and the snout also a trifle longer. This is perhaps due to some slight distortion of the specimens, owing to the greater length of time which the first had been in alcohol.

Epinephelus Drummond-Hayi, *sp. nov.*, Goode & Bean.

Diagnosis.—Length of head about one-third of total length (including caudal), and three-eighths of length without caudal. Greatest height of body equal to length of head. Least height of tail equal to half the length of external caudal rays, and approximately to that of snout. Præoperculum finely and evenly serrated; denticulations somewhat coarser at the angle. Suboperculum and interoperculum denticulated for a short distance on each side of their common junction. Maxillary bone nearly and mandibular quite reaching to a line drawn vertically through the centre of the orbit.

Eye circular, its diameter contained six and one-third times in the length of the head, and slightly less than the width of the interorbital area, which is half the distance from the snout to the centre of the orbit.

Distance of dorsal from snout equal to the greatest height of the body, and twice the length of the mesial caudal rays or of ventral fin. The length of the first spine is less than half that of the second, and more than one-third that of the fourth, and longest. The length of the first ray is equal to or greater than that of the longest spine; that of the last ray, to the diameter of the eye.

The distance of anal from snout equal to twice the height of the body at the ventrals; the length of its first spine about equal to that of the first of the dorsal; the length of the third spine equal to that of the snout. The length of the first ray is about equal to that of the maxillary; that of longest ray nearly half the length of head; that of the last ray nearly equal to that of the second anal spine.

Caudal truncate when expanded; slightly emarginate when in natural position; covered with small scales nearly to its tip.

Length of median rays half that of the head, that of external rays equal to two-thirds the distance from snout to pectoral, and also to the length of that fin.

The distance of ventral from snout about twice its own length.

Radial Formula.—D. XI, 16; A. III, 9; C. + 14 +; P. I, 16; V. I, 5.

Scales in lateral line, 125; above lateral line, 32; below, 56–57.

Color, light umber-brown, everywhere densely spotted with irregular,

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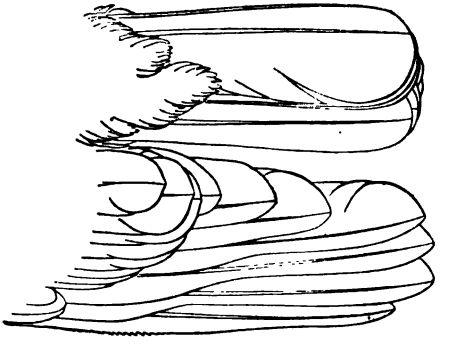
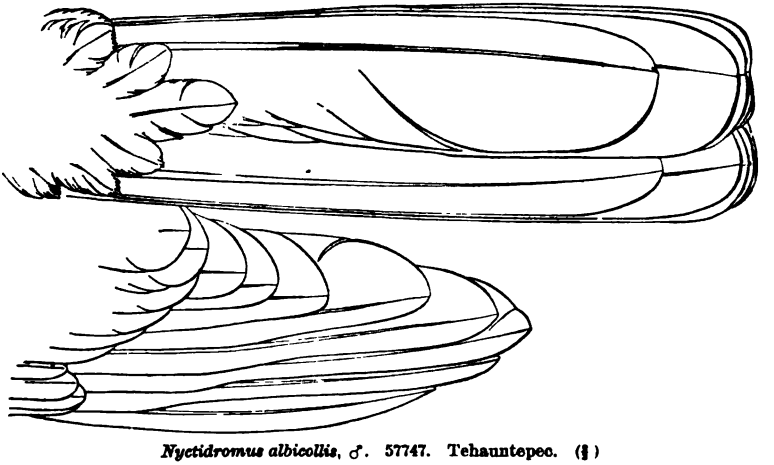
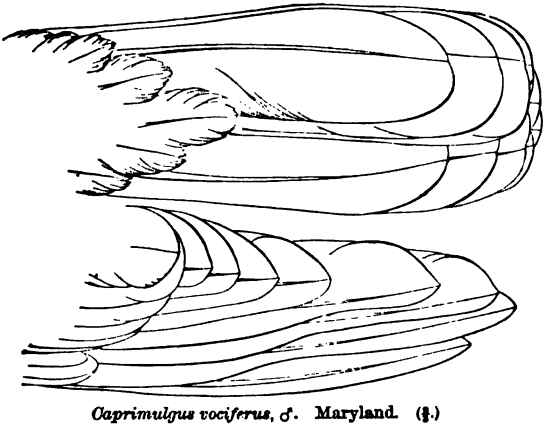


Caprimulgus nuttalli, ♂. Utah. (⅔.)



Nyctidromus albicollis, ♂. 57747. Tehauntepec. (⅔)



Caprimulgus vociferus, ♂. Maryland. (⅔.)

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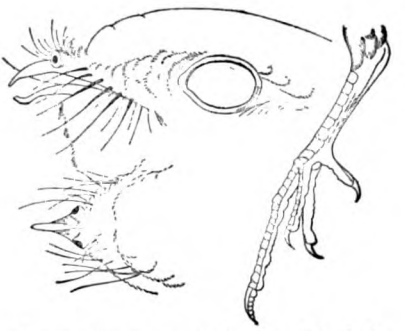
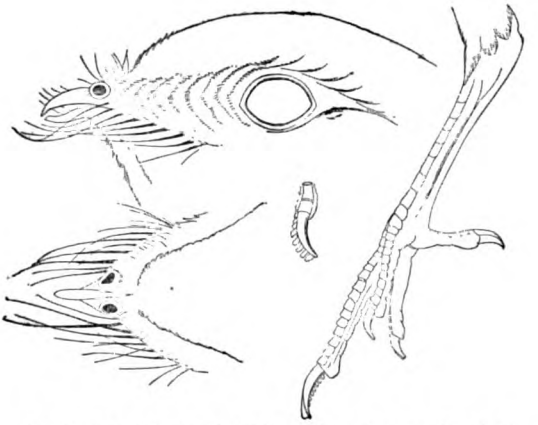


Caprimulgus nutalli, ♂. Utah. (Nat. size.]



Nyctidromus albicollis, ♂. 57747. Tehuantepec. (Nat. size.)

Caprimulgus vociferus, ♂. Maryland. (Nat. size.)

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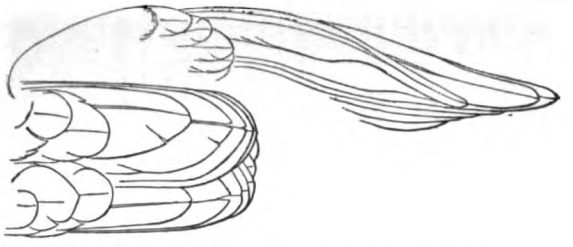
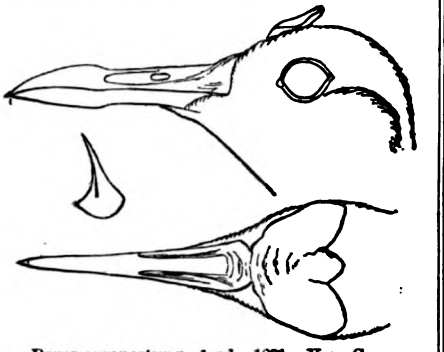
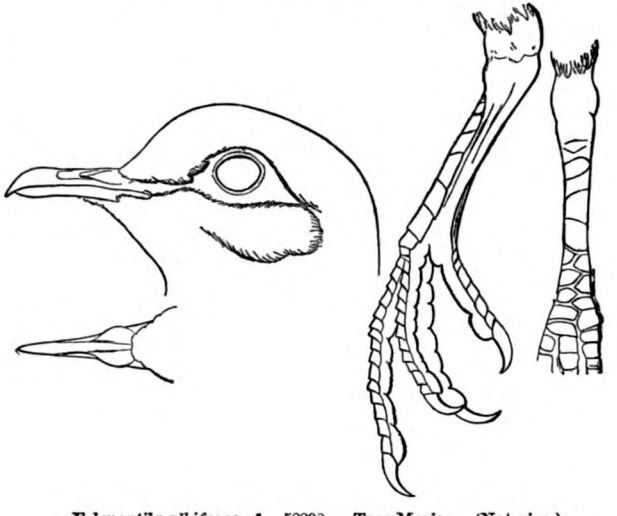


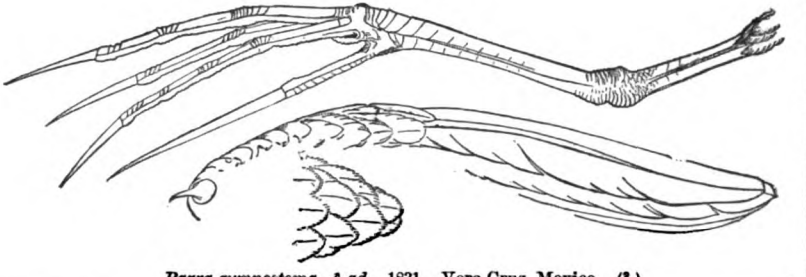
Æchmoptila albifrons, ♂. 58298. Tres Marias. (½.)



Parra gymnostoma, ♂ *ad.* 1831. Vera Crus, Mexico. (Nat. size.)



Æchmoptila albifrons, ♂. 58298. Tres Marias. (Nat. size.)



Parra gymnostoma, ♂ *ad.* 1831. Vera Cruz, Mexico. (½.)

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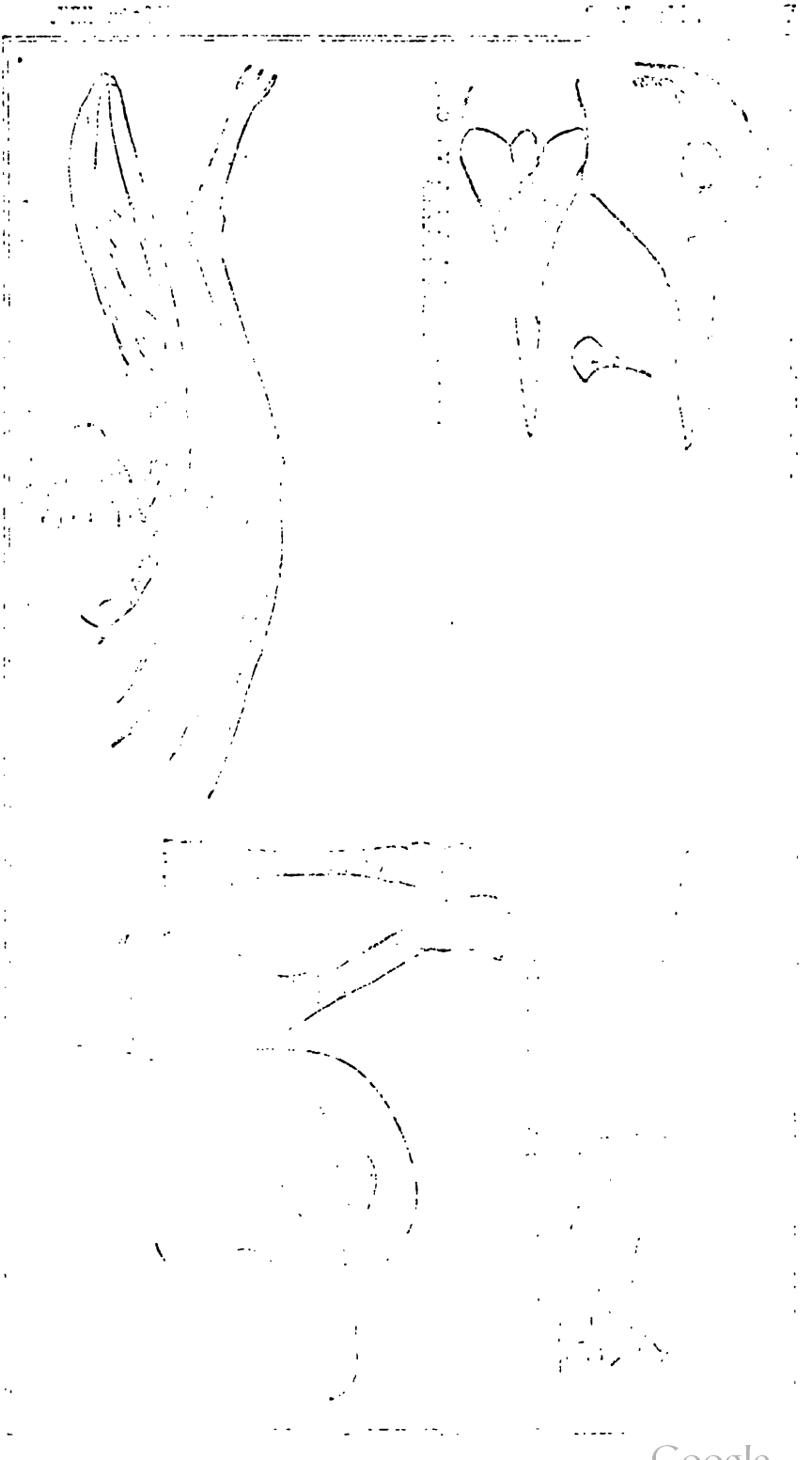

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somewhat stellate, white spots, except upon the lips and under margin of the body. There are about forty of these patches between the gill-opening and the base of the caudal. A slight tendency to coalesce may be observed in the spots upon the sides.

At Pensacola, this fish is called the Hind; at the Bermudas, it is the "John Paw".

Table of Measurements.

Current number of specimen	16,795.		21,255.	
Locality	Bermuda.		S. Stearns. Pensacola, Fla.	
	Millim.	100ths.	Millim.	100ths.
Extreme length (to base of caudal)	335	.....	360	.....
Length to end of middle caudal rays	399	.....	426	.....
Body:				
Greatest height (behind ventrals)	.....	38	.....	38
Height at ventrals	.....	35	.....	36
Least height of tail	.....	11	.....	11
Head:				
Greatest length	.....	38	.....	38
Width of interorbital area	.....	7	.....	7
Length of snout	.....	10½	.....	11
Length of operculum (to end of flap)	.....	12	.....	12
Length of maxillary	.....	17	.....	17
Length of mandible	.....	21	.....	20½
Distance from snout to centre of orbit	.....	14	.....	14
Diameter of eye	.....	6	.....	6
Dorsal (spinous):				
Distance from snout	.....	38	.....	39
Length of base	.....	27	.....	29
Length of first spine	.....	4	.....	4½
Length of second spine	.....	10	.....	11
Dorsal (soft):				
Length of base	.....	21	.....	24
Length of first ray	.....	13	.....	13
Length of longest ray	.....	(6th) 14	.....	(4th) 15
Length of last ray	.....	6	.....	6
Anal:				
Distance from snout	.....	70	.....	70
Length of base	.....	16	.....	16
Length of first spine	.....	4½	.....	4½
Length of second spine	.....	8½	.....	9
Length of third spine	.....	10½	.....	10
Length of first ray	.....	16	.....	17
Length of longest ray	.....	(3d) 18	.....	(4th) 18½
Length of last ray	.....	8	.....	8
Caudal:				
Length of middle rays	.....	19	.....	19
Length of external rays	.....	22	.....	22
Pectoral:				
Distance from snout	.....	33	.....	34
Length	.....	21	.....	22
Ventral:				
Distance from snout	.....	38	.....	40
Length	.....	19	.....	19
Branchiostegals	7	.....	7	.....
Dorsal	XI, 16	.....	XI, 16	.....
Anal	III, 9	.....	III, 9	.....
Caudal	+14+	.....	+14+	.....
Pectoral	1-16	.....	1-16	.....
Ventral	1-5	.....	1-5	.....
Number of scales in lateral line	125	.....	125	.....
Number of transverse rows above lateral line	(32)	.....	32	.....
Number of transverse rows below lateral line	(56)	.....	57	.....

WASHINGTON, *May* 25, 1878.

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DESCRIPTIONS OF TWO NEW SPECIES OF FISHES, LUTJANUS BLACKFORDII AND LUTJANUS STEARNSII, FROM THE COAST OF FLORIDA.

By G. BROWN GOODE and TARLETON H. BEAN.

Recent explorations on the coast of Florida have brought to light several undescribed species of large fishes. Some of them have already been named by us. Two species of Pristipomatoid fishes are characterized below.

Lutjanus Blackfordii, *sp. nov.*, Goode & Bean.

The well-known Red Snapper of our Southern coast has, strangely enough, never been scientifically described. This is due to an erroneous identification of this species with a common West Indian form, *Lutjanus aya*, from which it differs in several particulars, notably in the size of the eye and of the scales.

The species is dedicated to Mr. Eugene G. Blackford of New York City, to whom the National Museum is indebted for many hundreds of specimens of rare fishes, and by whose vigilant study of the New York fish-markets several species have been added to the fauna of the United States.

We base our description upon a fresh specimen (No. 21,330), sent from Pensacola, Fla., May —, 1878, by Mr. Silas Stearns, which is twenty-six inches long, and weighs 11½ pounds; also two well-executed casts, one, No. 12,515, obtained by Mr. Milner, in Washington City market, 1874, thirty inches long, and one, No. 20,978, thirty-three inches long, obtained from the Savannah Bank, March, 1878, by Mr. Goode.

Diagnosis.—Body much compressed; its upper profile ascending from the snout, with a slight concavity in front of eye to the origin of the spinous dorsal, thence descending in a long curve to the base of the caudal; under profile much less arched. Upper and lower jaw of even extent. The greatest height of the body equal to length of head. Least height of tail equal to one-third of the distance from the snout to the pectoral. Greatest height of head slightly less than one-third of total length, including caudal and three-eighths of length without caudal. Præoperculum finely and evenly serrated, except at the angle, where the denticulations are coarser: a slight emargination above the angle, in which is received an elevation upon the interopercular bone, and two shallower emarginations above. The maxillary falls short of the vertical line from the anterior margin of the orbit, the mandibular bone of that from the middle of the orbit. Eye circular; its diameter contained seven and one-third times in the total length of the head. Length of snout nearly equal to that of maxillary. Length of mandible equal to half the height of the body at ventrals, and equal to or slightly less than distance from snout to centre of orbit. Distance of dorsal from snout about three times the length of snout; its length of base nearly equal to that of the pectoral. The length of its longest spine is equal

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to twice the second anal spine, and about three times that of the first dorsal spine. The first dorsal ray is twice as long as the first dorsal spine, its longest ray nearly equal to the first ray of the anal.

Distance of anal fin from snout equal to two-thirds of total length (caudal excluded), twice as far from snout as is the pectoral; the length of its base slightly more than that of mandible; its first spine half as long as its second spine; its third spine slenderer, and slightly longer than the second; its first ray is about twice as long as its second spine; its longest ray equal to middle caudal ray, or, in young specimens, much longer; its last ray half the length of the first.

Caudal much emarginate, crescent-shaped; the median rays two-thirds as long as the external rays.

Pectoral midway between snout and anal; its length twice that of the maxillary. Distance of ventral from snout equal to the height of the body; its length three times that of second anal spine.

Radial Formula.—B. VII; D. X, 14; A. III, 9; C. + 17 +; P. I, 16; V. I, 5.

Scales.—8, 50, 15. Scales extending half the length of the anal rays on the membrane; on the external caudal rays nearly to tip, and with slight traces upon the spinous dorsal in front of the spines; and in the soft dorsal somewhat more extended.

Color.—Uniform scarlet. Centre of scales lighter, also belly, which is silvered; inside of axil of pectoral darker maroon.

This species is closely allied to the *Lutjanus torridus* of Cope, but differs in several particulars, notably (1) the smaller eye; (2) the greater number of dorsal and anal rays; (3) the smaller and more numerous scales; (4) the less emargination of the tail; (5) the shorter ventral fin (according to figure of Cope); (6) the higher occipital crest; and (7) in coloration.

Professor Cope's type measured 14 inches; ours range from 33 to 17½.

Lingual teeth in two patches; the anterior cordate, with emargination posteriorly; the other ovate-lanceolate, broadest anteriorly. Vomerine patch a quadilateral figure, with concave sides, and with the longest sides posteriorly. Palatine patches somewhat spatulate, broadest posteriorly.

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Table of Measurements.

Current number of specimen	21,330.	
Locality	Pensacola, Fla.	
	Millim.	100ths.
Extreme length	560	
Length to end of middle caudal rays	654	
Body:		
Greatest height		37½
Height at ventrals		36½
Least height of tail		11
Head:		
Greatest length		37½
Width of interorbital area		8½
Length of snout		14
Length of maxillary		14½
Length of mandible		18
Distance from snout to centre of orbit		17½
Diameter of eye		5½
Dorsal (spinous):		
Distance from snout		43
Length of base		29
Length of first spine		4½
Length of second spine		10
Length of longest spine		13
Height at last spine		7½
Dorsal (soft):		
Length of base		22½
Length of first ray		8
Length of longest ray		(6th) 11½
Height at last ray		7½
Anal:		
Distance from snout		68½
Length of base		15½
Length of first spine		3
Length of second spine		6½
Length of third spine		7½
Length of first ray		12
Length of longest ray		(3d) 16½
Length of last ray		6
Caudal:		
Length of middle rays		16
Length of external rays		24
Pectoral:		
Distance from snout		33
Length		30
Ventral:		
Distance from snout		37
Length		19½
Branchiostegals	7	
Dorsal	X, 14	
Anal	III, 9	
Caudal	+17+	
Pectoral	I, 16	
Ventral	I, 5	
Number of scales in lateral line	50	
Number of transverse rows above lateral line	8	
Number of transverse rows below lateral line	15	
Weight.....pounds	11½	

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Table of Measurements—Continued.

Current number of specimen	A.		B.		C.		D.	
Locality	Gulf of Mexico.		Gulf of Mexico.		Gulf of Mexico.		Gulf of Mexico.	
	Millim.	100ths	Millim.	100ths	Millim.	100ths	Millim.	100ths
Extreme length	650	.....	590	.....	460	.....	360	.....
Length to end of middle caudal rays	752	(29⅝in)	613	(24in)	540	(21¼in)	445	(17½in)
Body:								
Greatest height (behind ventrals)	.....	36	.....	37½	.....	36½	.....	37½
Height at ventrals	.....	35½	.....	36	.....	35½	.....	36½
Least height of tail	.....	11	.....	11	.....	11	.....	11
Head:								
Greatest length (to end of opercular flap)	.....	38	.....	38	.....	38	.....	37½
Width of interorbital area	.....	9	.....	8	.....	8	.....	8
Length of snout	.....	14½	.....	14	.....	14	.....	14
Length of upper jaw	.....	15	.....	15	.....	14½	.....	15½
Length of mandible	.....	18	.....	18	.....	17½	.....	18½
Distance from snout to centre of orbit	.....	17½	.....	18	.....	17½	.....	18
Diameter of eye	.....	5	.....	5½	.....	5½	.....	6
Dorsal (spinous):								
Distance from snout	.....	41	.....	43	.....	41½	.....	42½
Length of base	.....	26½	.....	27½	.....	27	.....	28
Length of first spine	.....	3½	.....	4	.....	3	.....	4½
Length of second spine	.....	9	.....	9	.....	9½	.....	10
Length of longest spine	.....	11½	.....	12½	.....	13½	.....	13½
Length of last spine	.....	6½	.....	8	.....	8	.....	9
Dorsal (soft):								
Length of base	.....	22	.....	22	.....	22½	.....	20½
Length of first ray	.....	7	.....	9½	.....	9½	.....	9½
Length of longest ray	.....	10	.....	13	.....	12	.....	12
Length of last ray	.....	6	.....	6	.....	6½	.....	6
Anal:								
Distance from snout	.....	68	.....	69	.....	70	.....	72½
Length of base	.....	15½	.....	15	.....	15	.....	15
Length of first spine	.....	3	.....	3½	.....	3½	.....	5
Length of second spine	.....	.....	.....	7	.....	7½	.....	9½
Length of third spine	.....	7	.....	8½	.....	8½	.....	9½
Length of first ray	.....	11	.....	12½	.....	12	.....	12
Length of longest ray	.....	14	.....	14½	.....	18	.....	16½
Length of last ray	.....	6½	.....	6½	.....	7	.....	7
Caudal:								
Length of middle rays	.....	15½	.....	18	.....	17	.....	17
Length of external rays	.....	21	.....	26	.....	26	.....	26
Pectoral:								
Distance from snout	.....	35	.....	35½	.....	34	.....	35½
Length	.....	27	.....	33	.....	32	.....	32
Ventral:								
Distance from snout	.....	38½	.....	38	.....	38	.....	39½
Length	.....	17	.....	20½	.....	20	.....	21
Branchiostegals	7	.....	7	.....	7	.....	7	.....
Dorsal	X, 14	.....	X, 14	.....	X, 14	.....	X, 14	.....
Anal	III, 9	.....	III, 9	.....	III, 9	.....	III, 9	.....
Caudal	+17+	.....	+17+	.....	+17+	.....	+17+	.....
Pectoral	I, 16	.....	I, 15–16	.....	I, 16	.....	I, 16	.....
Ventral	I, 5	.....	I, 5	.....	I, 5	.....	I, 5	.....
No. of scales in lateral line	50	.....	50	.....	50	.....	50	.....
No. of transverse rows above lateral line	9	.....	9	.....	9	.....	9	.....
No. of transverse rows below lateral line	16	.....	16	.....	16	.....	16	.....
Weight.....pounds	15½	.....	8½	.....	5	.....	.....	.....

Lutjanus Stearnsii, *sp. nov.*, Goode & Bean.

A single specimen of the Mangrove Snapper of Pensacola was sent by Mr. Silas Stearns, to whom the species is dedicated, as a slight acknowledgment of his services in securing for the United States National Museum large collections of fishes from the Gulf of Mexico and fresh waters adjacent to Pensacola, Fla.

Upon this individual (catalogue number 21,337), our description is based, having been drawn up from the fresh specimen. Its length is 19¾ inches. Besides the alcoholic preparation, the Museum has also a cast and a color-sketch.

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Diagnosis.—This species may be readily distinguished from *L. Blackfordii* by its different color, lower and less compressed body, shorter head, shorter pectorals and ventrals, and by other characters which appear in the table of measurements.

Body similar to that of *L. Blackfordii* in shape. It greatest height equals length of head, twice length of mandible, and twice that of ventral. Its height at ventrals equals four times width of interorbital area. Least height of tail equals first anal ray and twice the last dorsal ray. Greatest length of head equals greatest height of body, twice length of mandible, and twice ventral length. The width of interorbital area equals one-fourth of height at ventrals and two-thirds of least height of tail. Length of snout equals second anal ray. Length of maxillary equals twice length of second dorsal spine, which equals second anal spine. The mandible equals the ventral in length. Eye contained slightly more than six times in greatest length of head.

Distance of dorsal from snout equals three times, and base of spinous dorsal twice length of snout. First dorsal spine about equal to first anal. Second dorsal spine equals second anal and twice first anal.

Longest dorsal spine (fourth) equals one-third of greatest length of head. Last dorsal spine about equal to half distance from snout to centre of orbit. Base of soft dorsal equals three times second spine of dorsal. First ray of dorsal equals three-fourths of first anal ray, which equals least height of tail. Longest dorsal ray (fourth) equals twice diameter of eye, and the last equals half of least height of tail.

Distance of anal from snout equals slightly more than six times least height of tail; its length of base somewhat exceeds length of second anal ray. First anal spine equals half the second, which is half the length of upper jaw. Third anal spine equals half second anal ray, which equals length of snout. First anal ray equals least height of tail; second equals length of snout, and last equals half length of snout.

Middle caudal rays equal one-sixth and superior external rays one-fourth of total length. Inferior external rays slightly less than length of pectoral.

Distance of pectoral from snout about equal to length of head. Its length almost twice least height of tail.

Distance of ventral from snout nearly three times length of snout; its length equals half length of head.

Radial Formula.—B. VII; D. X, 14; A. III, 8; C. + 17 +; P. I, 15; V. I, 5.

Scales.—6, 45, 14.

Color.—General color scarlet below, shading into reddish or purplish brown above. Plum color on sides and top of head. Below the lateral line, the posterior half of the exposed portion of the scales is white tinted with scarlet; the basal portion reddish and much darker. Under part of head light scarlet. Vertical fins darker than the body. Pectoral and ventral white roseate.

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Teeth.—Vomerine teeth in a patch shaped like a spear, with concave cutting edges and acutely produced angles.

Table of Measurements.

Current number of specimen	21,337.	
Locality	Pensacola, Fla.	
	Millim.	100ths.
Extreme length without caudal	430	
Length to end of middle caudal rays	501	(19⅞ in.)
Body:		
Greatest height		34
Height at ventrals		32
Least height of tail		12
Head:		
Greatest length		34
Width of interorbital area		8
Length of snout		13
Length of operculum		11
Length of maxillary		14
Length of mandible		17
Distance from snout to centre of orbit		15½
Diameter of eye		5½
Dorsal (spinous):		
Distance from snout		39½
Length of base		26
Length of first spine		3½
Length of second spine		7
Length of longest spine		(4th) 11½
Length of last spine		7½
Dorsal (soft):		
Length of base		21
Length of first ray		9
Length of longest ray		(4th) 11
Length of last ray		6
Anal:		
Distance from snout		73
Length of base		13½
Length of first spine		3½
Length of second spine		7
Length of third spine		6½
Length of first ray		12
Length of longest ray		(2d) 13
Length of last ray		6½
Caudal:		
Length of middle rays		16½
Length of external rays { superior		25
Length of external rays { inferior		23
Pectoral:		
Distance from snout		33½
Length		23½
Ventral:		
Distance from snout		38½
Length		17
Branchiostegals	7	
Dorsal	X, 14	
Anal	III, 8	
Caudal	+17+	
Pectoral	I, 5	
Ventral	I, 15	
Number of scales in lateral line	45	
Number of transverse rows above lateral line	6	
Number of transverse rows below lateral line	14	

A NOTE ON THE GULF MENHADEN, BREVOORTIA PATRONUS, GOODE.

By SILAS STEARNS.

The Gulf Menhaden are first seen about Pensacola in April. They enter the harbor in small schools, swimming at the surface, rippling the water as they go. I have never seen any large schools, perhaps not more than four or five barrels in one body; but the number of small schools which might be seen in a few hours at the right place and in a

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favorable time would make an immense school or schools, if consolidated. The fishermen report them in small bunches outside and offshore. I have never seen one in the spring which would measure over six inches, and the greater number measure less than that; all the fishermen confirm this.

They seem to stay in brackish water until they get accustomed to the change, and lose their parasite,* and then go directly into the fresh water. About May 27, I hauled a seine in a fresh-water stream near the head of the bay, and caught nearly a barrel of *Brevoortia patronus*. Their color was darker, and I did not find any parasites in their mouths. Their stomachs were full of food, but I could find no traces of spawn or milt. I do not know exactly when they return from fresh water, but last October Major Staples and I caught about two dozen in a gill-net with a mesh of 3½ inches. I remember that they were gilled very hard, and therefore judge that they must have been quite large. I am quite positive that they belonged to the same species.

PENSACOLA, FLA., *June* 6, 1878.

A NOTE UPON THE BLACK GROUPER (EPINEPHELUS NIGRITUS (HOLBROOK) GILL) OF THE SOUTHERN COAST.

By G. BROWN GOODE and TARLETON H. BEAN.

Among the specimens from Pensacola sent by Mr. Stearns, there is the "Jew-fish" of West Florida, said to attain the weight of three or four hundred pounds.

The specimen (No. 21,329) measures in length 29 inches, and weighs 16 pounds. It was described while in a fresh condition.

SYNONYMY.

Serranus nigritus, HOLBROOK, Ichthyology of South Carolina, p. 173, pl. XXV, fig. 2.—GÜNTHER, Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum, I, 1859, p. 134.

Epinephelus nigritus, GILL, Proceedings of the Academy of Natural Sciences of Philadelphia, 1865, p. 105; Report of the U. S. Commissioner of Fish and Fisheries for 1871–72, 1873, p. 806; Catalogue of the Fishes of the East Coast of North America, 1873, p. 28.

DESCRIPTION.

Diagnosis.—Body oblong, thick, tapering very gradually from the insertion of the dorsal and the end of the ventral. Its greatest height (behind ventrals) is contained three and one-sixth times in total length (caudal included) and about equal to length of head. The height of body at ventrals is slightly greater than one-third of total length with-

*This species is infested by the same parasite which is so common in the mouths of the common Menhaden in Southern waters, the *Cymothoa prægustator* (Latrobe) Say.

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out caudal, double the greatest width of the body, and three times the least height of tail.

Head a trifle longer than greatest height of body and slightly less than twice the length of the pectoral. The width of the interorbital area is half that of the head, and nearly double the diameter of the eye. The length of the snout is about equal to that of the operculum. The preoperculum is finely serrated on its posterior limb, slightly produced at the angle, the edge of which is obtusely rounded, and armed with stronger denticulations. Upon the inferior limb in front of the angle is one stout spine. Lips scaleless. Maxillary with a few minute scales arranged in a narrow band. Length of the upper jaw nearly half the length of head and quite half the greatest height of the body. Length of mandible about double that of the operculum. Length of mandible slightly more than that of pectoral.

Eye circular, its diameter nearly nine times in length of head and nearly twice in width of interorbital space. Its anterior margin is midway between the tip of the snout and the posterior edge of the preoperculum.

Dorsal as far from the snout as ventral, its length of base three-fourths that of the head. The length of the first spine slightly exceeds the diameter of the eye, the second spine is as long as the base of the anal fin and about equal to the longest anal ray. The length of the last spine is twice that of the first. The length of base of soft dorsal is four-fifths that of the spinous dorsal, which is exactly double the length of the longest dorsal ray. The last ray is half as long as the first ray of the anal.

The distance of the anal from the snout is three-fourths of the length of the body without caudal. Its length of base is equal to the length of the second dorsal spine. The relations of the length of the spines and rays of the anal fin are exhibited in the table of measurements.

Caudal fin rounded, its middle rays half as long as the head, the exterior rays slightly shorter.

The pectoral is very broad and rounded, its insertion considerably in advance of the end of the opercular flap. Its length slightly exceeds that of the middle caudal rays.

Ventrals broad, distant from snout three-eighths of the length of the body and as long as the pectoral. The ventral spine is as long as the last dorsal spine.

Scales of moderate size, with minute pectinations, truncate at the attached end. When detached, their shape is nearly oblong.

Color, dusky brown above, lighter below; fins darker; no traces of markings upon body or fins.

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Table of Measurements.

Current number of specimen	21,389.	
Locality	Pensacola, Fla.	
	Millim.	100ths.
Extreme length (39 inches)	610	
Length to end of middle caudal rays	735	
Body:		
Greatest height		30
Greatest width		17
Height at ventrals		30
Least height of tail		12
Head:		
Greatest length		40
Greatest width		17½
Width of interorbital area		8½
Length of snout		10
Length of operculum		11
Length of maxillary		18½
Length of mandible		22½
Distance from snout to orbit		13½
Diameter of orbit		4½
Dorsal (spinous):		
Distance from snout		37½
Length of base		31
Greatest height		16½
Length of first spine		5
Length of second spine		16½
Length of last spine		10
Dorsal (soft):		
Length of base		24½
Length of first ray		14
Length of longest ray (seventh)		15½
Length of last ray		7
Anal:		
Distance from snout		76
Length of base		16½
Length of first spine		2½
Length of second spine		6½
Length of third spine		9½
Length of first ray		14½
Length of longest ray (second)		16
Length of last ray		9
Caudal:		
Length of middle rays		20½
Length of external rays		19½
Pectoral:		
Distance from snout		35
Length		21½
Ventral:		
Distance from snout		37½
Length		21½
Branchiostegals	7	
Dorsal	X, 15	
Anal	III, 9	
Caudal	+ 17 +	
Pectoral	2, 16	
Ventral	I, 5	
Number of scales in lateral line	115	
Number of transverse rows above lateral line	24	
Number of transverse rows below lateral line	59	

WASHINGTON, *June* 1, 1878.

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CATALOGUE OF THE BIRDS OF ST. VINCENT, FROM COLLECTIONS MADE BY MR. FRED. A. OBER, UNDER THE DIRECTIONS OF THE SMITHSONIAN INSTITUTION, WITH HIS NOTES THEREON.

By GEORGE N. LAWRENCE.

Before Mr. Ober's final visit to Dominica, he made collections in Antigua and Barbuda. These were left with the United States consul at Antigua, to be forwarded to the Smithsonian Institution when there was an opportunity to do so. This was in September, 1877; but they have not yet been received.

After completing his investigations in Dominica, he went to St. Vincent, whence he writes under date of October 9:—"As soon as I reached the mountains I was taken sick. It has been quite discouraging. I have suffered from another attack of fever. I feel pretty well now, and hope to keep so." He wrote under date of December 10:—"I expect to leave for Grenada January 15." But unfortunately he had a relapse of fever, by which he was completely prostrated, as, in a letter dated January 25, he says:—"I am just convalescing from a long fever; camping in this very wet weather brought it on. I have been laid up since December 19. I lost all my flesh, and was so weak when I first left my bed that I could scarcely stand. Though I have been here a long while, I have accomplished little, owing to the rains and the actual impossibility of working the woods then, without a pull-up such as I am getting. I hope to be all right in a week, and, as drier weather is at hand, to rapidly finish this island, and then push through the Grenadines to Grenada. From there, retrace my steps here for mails, &c., and then go to Martinique."

Mr. Ober's long sickness, together with the rains, prevented him from making but a moderate collection at St. Vincent. He was to leave for Grenada on the 29th of February.

The collection from St. Vincent was kindly taken in charge by Rear-Admiral Trenchard, commanding the United States steamer Powhatan, early in March. It was received at the Smithsonian on the 25th of that month, and forwarded to me a few days thereafter. It consists of but ninety specimens, and some of the species are poorly represented in numbers.

The subjoined account from Mr. Ober, of the geographical position of the island, with its natural and zoological peculiarities, seems to convey valuable information. This, with his observations on the habits of birds, &c., are indicated by quotation-marks:—

"St. Vincent, February 28, 1878. This island lies in latitude 13° 15° north and longitude 61° 10′ west. It is about 100 miles due west of Barbadoes, and is one of the long chain of volcanic islands extending from latitude 17° 50′ north to latitude 12° north.

"Like Dominica, Guadeloupe, Martinique, St. Lucia, and Grenada, it is very mountainous; nearly the whole surface is tossed with hills, and even the level land, as it is called, is of this character.

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"Like the other islands of the chain, it has a longitudinal axis in the shape of a range of hills extending its entire length. Here and there are peaks approaching the dignity of mountains, the highest about 3,000 feet. In the northern part is the famous 'Souffriere', a mountain with a crater a mile in diameter, a slumbering volcano which, in 1812, by a tremendous eruption, spread havoc and ruin all around it. Before this eruption, the mountain was probably much higher than at present, as the top was blown completely off and a new crater opened. Evidence of its work may be seen at the present day in the deep gullies scooped out of the mountain side and the plain beneath by the lava flow in its great rush to the sea. I counted five of these dry rivers in sailing along the leeward coast. The most extensive is on the windward coast, at least 300 yards in width.

"St. Vincent has more cultivable land than Dominica, owing to the windward side sloping gradually from the foot hills to the sea, a tract from one to two miles in width of undulating surface, though rough and elevated in places.

"As will be seen, the avifauna resembles much that of Dominica—some birds of the same species in greater or less abundance, a few replaced by others of near affinity, and one or two new forms.

"The Island Parrot *Chrysotis guildingi* is peculiar to this island, but I doubt if there are other birds whose habitat is restricted to this small range. Were I possessed of all the information I hope to get by the time my investigations are completed, I might speak of the peculiarity of these insular faunæ, by which I find, in islands separated by a narrow breadth of water—say, from 15 to 30 miles—birds found in one that never visit the other. Notable examples could be given, but I wish to speak authoritatively and from more extended experience.

"It is strange that in an island more than two degrees south of Dominica, I find so little difference in the plumage of birds; hardly any increase of those tropical species of bright plumage, which are so abundant further south in Tobago and Trinidad. In fact, so far as the fauna of each island is concerned, and in external character of surface and soil, and even in the component elements of the latter, Dominica and St. Vincent could scarcely be more alike. To a superficial observer these facts are apparent, as well as to one who studies them.

"In numbers, as well as in species, this island is greatly deficient. To what cause to attribute this disparity when the forests and fields teem with bird-food, and islands further south teem with birds, I am at a loss. Perhaps the reason may appear later, in the process of careful investigation.

"The most striking instance of the absence of any particular form or family, is that of the Picidæ. Countless trees, decaying and dead, under the influence of a never-ceasing destructive power, which would afford food for thousands of birds; which are infested and alive with ants, borers, &c., found in every forest. Not a woodpecker; millions of nut-

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and seed-producing trees, and you may look in vain for any member of the squirrel family.

"And among birds and among quadrupeds, there is no animal here that takes their places.

"These few notes, hasty and crude, may aid in the conception of the appearance of animal life here, and only for that purpose are they offered.

"I send, by the same conveyance with the birds, 46 specimens of Carib hatchets, axes, knives, &c., illustrating the crude state of advancement in which they existed, as compared with their enemies and coexistent tribes of the larger islands.

"Allow me in this connection to acknowledge the courtesy of the officials and planters of St. Vincent. To His Excellency George Dundas, Esq., C. M. G. Lieut. Governor of St. Vincent; Edward Laborde, Colonial Secretary; and to Hon. Henry Shaw, Treasurer of the island, I am especially indebted for facilities in prosecuting my work, as well as for social pleasures that have greatly relieved the tedium of life in a new place.

"To the proprietors and managers of the different estates, I am greatly indebted; to James Milne, Esq., of Rutland Vale, for a residence in the country when recovering from fever; to Messrs. D. K. Porter & Co., Kingstown, for letters of introduction, horses, and men. Finally, it is only incumbent upon me to add that I have received nothing but kind treatment, and have found most unbounded hospitality throughout the island.

"FREDERICK A. OBER."

Fam. TURDIDÆ.

1. **Turdus nigrirostris**, Lawr., Ann. N. Y. Acad. Sci., vol. 1, p. 147.

"Thrush, ♀. Length, 9¼ in.; alar extent, 14; wing, 4½.

"Found on lower ground than *Margarops montanus*. Not numerous."

2. **Margarops herminieri** (Lafr.).

"Have heard the unmistakable whistle of this bird, and have seen it as it flitted by in the dusk of the high woods, but have not obtained it."

3. **Margarops montanus** (Vieill.).

"Found only in high woods and valleys. Not very abundant. I have not seen the larger species of this genus."

4. **Cinclocerthia ruficauda**, Gould.

"'Trembleur'. ♂. Length, 9 in.; alar extent, 12½; wing, 4.

"Not so abundant as in the woods of Dominica, but still plentiful. Iris yellow."

5. **Mimus gilvus**, Vieill.

"'Mocking bird.'

"Male, length, 10¼ in.; alar extent, 14; wing, 4½.

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"Female, length, 9¾ in.; alar extent, 12¾; wing, 4⅛.

"Pretty common in the lowlands and cleared places. In shape and habits it resembles the Mockingbird of the States. Its habit of dodging in and out of the palm tops, recalls the American species. It is vastly inferior in song however, but trills very sweetly a few notes."

There are five specimens in the collection, differing in no respect from an undoubted example of this species from Guiana.

Fam. SYLVIIDÆ.

6. Myiadestes sibilans, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 148.

"'Souffriere Bird.'

"Length, ♂, 7½ in.; alar extent, 11; wing, 3½; tail, 3.

"Length, ♀, 7½ in.; alar extent, 11¼; wing, 3½; tail, 3.

"This bird has been an object of search for fifty years, and has so long eluded the vigilance of naturalists and visitors to the mountains, that it is called the 'invisible bird'. From being seen only on the Souffriere Mountain, it has acquired the name of the 'Souffriere bird'. It is popularly believed to be found only on the Sulphur Mountain, but is an inhabitant of all the high ridges containing deep woods and ravines. Shy and exceedingly observant, it was not until my third search for it that I captured it. Though I fear the popular belief that it is a resident of this island only is erroneous, still I was piqued at the reputation it held of being invisible, and resolved to capture it. To do this I camped five days and nights on the mountain top, 3,000 feet above the sea, in a cave on the brink of the crater. I got five birds by using all my arts of allurement, calling them within shot by using a call taught me by the Caribs.

"The bird is mentioned in Gosse's Birds of Jamaica, and considered identical with the 'Mountain Whistler' (*Myiadestes genibarbis*) of Dominica and Jamaica. This was merely conjecture, and should it prove nothing else, I can claim the credit of settling the doubt.

"There are differences in the notes of the two birds, though great similarity in their habits. I send you seven specimens."

Mr. Ober quotes Mr. Gosse as considering the St. Vincent bird to be identical with the one inhabiting Jamaica. But Mr. Gosse does not precisely say that, but says concerning it (Birds of Jamaica, p. 200) that he received the following note from Mr. Hill:—"I find among some detached notes of mine the following memorandum respecting a similar bird in the smaller West India islands. 'The precipitous sides of the Souffriere Mountain in St. Vincent,' says a writer describing the volcano which so disastrously broke out there in 1812, 'were fringed with various evergreens, and aromatic shrubs, flowers, and many Alpine plants. On the north and south sides of the base of the cone were two pieces of water, one perfectly pure and tasteless, the other strongly impregnated with sulphur and alum. This lonely and beautiful spot was

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rendered more enchanting by the singularly melodious notes of a bird, an inhabitant of those upper solitudes, and altogether unknown to the other parts of the island; hence supposed to be invisible, though it certainly has been seen, and is a species of Merle.'"

Neither does Mr. Gosse allude to its being similar to the bird found in Dominica. Mr. Ober was misled probably by Mr. Gosse using *M. genibarbis* (which is the correct name for the Dominica species) as a synonym of *M. armillatus*, which he supposed the Jamaica Solitaire to be, but which has been given a distinct name by Professor Baird, viz, *Myiadestes solitarius*.

Fam. TROGLODYTIDÆ.

7. Thryothorus musicus, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 149.

"Wren; 'Wall Bird.'

"Length, 5½ in.; wing, 2½; alar extent, 7¾.

"The sweet warble of this lively little bird may be heard morning, noon, and night about the houses and sugar-mills, as well as far up the mountain sides and valleys. It is quite plentiful and often has deceived me in its note, as it was mistaken for that of a warbler. It builds its nest in the walls of houses and holes in trees. Saw one constructing a nest in October. Found on the Souffriere, 3,000 feet above the sea."

Fam. SYLVICOLIDÆ.

8. Leucopeza bishopi, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 151.

"Wren?

"Length, ♂, 5¾ in.; alar extent, 8½; wing, 2¾.

"While engaged in my search for the Souffriere bird, I noticed a sprightly little bird that came skipping through the trees at my call. It seemed rather shy, but this may be owing to the presence of man in such a secluded situation, and it was with difficulty I shot two. Since then I have shot another; none of them below 1,000 feet altitude. Its note is very sharp; either the male or the female gives utterance to the syllable, 'few, few, few,' etc., eight or ten times, immediately answered by the mate with, 'whit, whit, whit,' etc., the same number of times."

9. Setophaga ruticilla (Linn.).

"Not often seen."

Fam. VIREONIDÆ.

10. Vireosylvia calidris *var.* **dominicana**, Lawr.

"*Vireo calidris?* Everywhere abundant.

"Length, ♂, 5¾ in.; alar extent, 9; wing, 3.

"Length, ♀, 6 in.; alar extent, 9¼; wing, 3⅛."

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Fam. HIRUNDINIDÆ.

11. Progne dominicensis (Gm.).

"Length, ♂, 7½ in.; alar extent, 15½; wing, 5⅞.

"I saw the first this month, February, at the same time with, and in the same place as, the Tropic bird (Phæthon). I think, however, both are residents."

Fam. CÆREBIDÆ.

12. Certhiola atrata, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 150.

"*Certhiola?*

"Length, ♂, 4⅞ in.; alar extent, 8; wing, 2¾.

"Length, ♀, 4 in.; alar extent, 7; wing, 2¼.

"This black species seems to have almost entirely replaced the black and yellow one of Dominica, etc. It is abundant mixing with the 'black bird' (*Loxigilla noctis*) in the cotton-trees and plantains, so as to be hardly distinguished. The love for the flowers of the banana and plantain, and the fruit as well, is the same trait possessed by the Dominica species."

13. Certhiola saccharina, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 151.

"*Certhiola.*

"Length, ♂, 4⅝ in.; alar extent, 7¾; wing, 2½.

"Length, ♀, 4½ in.; alar extent, 7½; wing, 2½.

"Not so abundant as the preceding. Called the 'Molasses bird'."

Fam. TANAGRIDÆ.

14. Euphonia flavifrons (Sparm.).

"Length, ♂, juv., 5 in.; alar extent, 8; wing, 2¾.

"Only observed in the high valleys, and only one seen. A quiet, unsuspicious bird; feeds on a berry known here as the misseltoe, and hence called the 'misseltoe bird'."

15. Calliste versicolor, Lawr., Ann. N. Y. Acad. Sci. vol. 1, p. 153.

"Length, ♂, 6¼ in.; alar extent, 10; wing, 3⅝.

"Length, ♀, 6 in.; alar extent, 10; wing, 3¼.

"At 'Carabries', the highest place of residence in the island, I first found this bird, feeding on the gommier seeds and others; frequently flying into the high woods, but remaining principally in the more open tracts bordering the negro provision grounds. In the heat of the day, and when it was windy, they kept more in the low shrubbery, feeding on the seeds of a low bush."

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Fam. FRINGILLIDÆ.

16. Loxigilla noctis (Linn.).

"'Black-bird.'

"Length, ♂, 5¼ in.; alar extent, 9; wing, 3.

"Length, ♀, 5 in.; alar extent, 8½; wing, 2⅞.

"The young at first are like the females—gray. Its favorite tree is the silk-cotton; it is very plentifully distributed."

There is but one pair of this species in the collection; they are of rather smaller dimensions than examples from Dominica. The bill is also somewhat smaller, but yet very much larger than that of the bird from Guiana, which I called var. *propinqua* in the Dominica catalogue; the last is of a much smaller size.

17. Phonipara bicolor (Linn.).

"'Ground Sparrow.'

"Length, ♂, 4¼ in.; alar extent, 6⅜; wing, 2.

"The most numerous of any species; everywhere it is found, except, perhaps, in the depths of the 'high woods'. It breeds in nearly every month from February to October; its nest is dome-shaped, like nearly all those of small birds in these islands. I procured many nests and eggs in Dominica."

Fam. ICTERIDÆ.

18. Quiscalus ?

"A bird called the 'Bequia Sweet', from its note; a black bird, much resembling the Crow Blackbird, though smaller, the female the color of the female Cowbird; is plentiful in the adjacent keys, and a few have been blown here by storms."

Fam. TYRANNIDÆ.

19. Elainea martinica (Linn.).

"Flycatcher.

"Length, ♂, 6⅞ in.; alar extent, 11; wing, 3½.

"The most common of these birds; much frequents the silk-cotton tree and the low bushes on hill sides."

20. Myiarchus oberi, Lawr.

"Flycatcher; 'Piperee.'

"Length, ♂, 8½ in.; alar extent, 12½; wing, 4.

"A companion of the preceding species, and found in the same localities."

21. Tyrannus rostratus, Scl.

"Piperee.

"Length, ♂, 9 in.; alar extent, 15½; wing, 4⅜.

"Common in town and country."

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Fam. TROCHILIDÆ.

22. Eulampis jugularis (Linn.).

"Few are seen below the high valleys, and there, even, it is by no means common."

23. Eulampis holosericeus (Linn.).

"Exceedingly scarce, and like the above species found more frequently in the highlands than in the lowlands."

24. Orthorhynchus ornatus, Gould?

"'Doctor bird.' *O. exilis?*

"The only species which is numerous, especially in the gardens. The most interesting Hummingbird's nest I have yet seen is one of this bird's, being attached to a hanging rope, and containing two eggs; found in October."

Mr. Ober sent but one pair of this species, which he queries if not *O. exilis*. The male agrees closely with *O. ornatus*, Gould, as described and figured by him (Mon. of Trochilidæ), having the ends of the crest-feathers decidedly blue.

Mr. Elliot (Ibis, 1872, p. 355) remarks as follows:—"This species, if it is really entitled to such a distinction, is found exactly between *O. cristatus* of Barbadoes and St. Vincent, and *O. exilis* of the Virgin Islands and Nevis. It has perhaps a little more blue upon the crest; but if the locality is wanting, it is not an easy matter to separate specimens from *O. exilis*, to which the present bird bears a close resemblance."

Mr. Elliot gives as its localities "Martinique and St. Lucia", and names "St. Vincent and Barbadoes" as the homes of *O. cristatus*. I have *O. cristatus* from Barbadoes, but the bird now sent from St. Vincent agrees well with *O. ornatus*, and Mr. Ober states that it is the only species of *Orthorhynchus* found there, and is abundant. I have not seen specimens of this genus from either Martinique or St. Lucia. I have examined examples of *O. exilis* from several islands, and they have been remarkably uniform in appearance, the ends of the crest-feathers being bluish-green, while in *O. ornatus* the termination of the crest is of a clear blue; in each the color of the tip gradually merges into the golden-green of the other portion of the crest. In *O. cristatus*, the two colors of the crest, violet-blue and golden-green, are about equally and trenchantly divided.

Fam. CYPSELIDÆ.

25. "Chætura?

"Skims the country everywhere; is different from the Dominica species. Nests have been found in chimneys in the country districts."

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Fam. ALCEDINIDÆ.

26. "**Ceryle alcyon** (Linn.).

"Not abundant. The same habits as the Northern Kingfisher; must be a resident. Have seen it in Dominica in April and September; here from October to February."

Fam. CUCULIDÆ.

27. Coccyzus minor (Gm.).

"'Cuckoo, Manioc.'

"Wherever there is a field with low bushes, or dense clumps of mangoes with open spaces intervening, on hillsides as well as plains, this bird may be found. Its peculiar cry is said to be heard always before a rain, giving it the name of 'Rain Bird'—a name, however, not confined to this species, as local names are given without any reason, except the fancy of the people bestowing it."

28. Crotophaga ani, Linn.

"'Tick Bird.' 'Chapman Bird.'

"Introduced, but assimilates well. A lazy, unsuspicious bird, frequenting cattle-fields, and delighting to congregate in bunches of half a dozen or so in the tops of small trees. Is said to eat the cattle ticks, and for this purpose was introduced. Is always in a state of emaciation, but the stomach is generally well filled with ticks and small Coleoptera."

Fam. PSITTACIDÆ.

29. Chrysotis guildingi (Vigors).

"Length (fresh), ♂, 18½ inches; alar extent, 32½; wing, 10½; tail, 7¾.

"Length (fresh), ♀, 19 inches; alar extent, 33; wing, 11.

"Is confined to the great central ridge running through the island; on this, and on the thickly wooded spurs this parrot is found. Like the Ramier, it feeds in the tops of the highest trees, and its season of good condition is the later months in the year. Mates in February, March, and breeds in April and May. Is then most easily approached, though ever shy and vigilant. Is sometimes caught (but only by breaking a wing by a shot) and takes kindly to confinement. The governor of St. Vincent, G. Dundas, Esq., C. M. G., has two which can articulate a few words. As a rule, however, they are difficult to teach. This is the only species on the island."

I have appended a description of this rare and beautiful species.

Male.—The sinciput is of an ashy-white; the feathers of the top of the head have their bases pale orange, which color increases until on the occiput the feathers are entirely of a fine orange; lores and around the eye grayish-white; cheeks pale orange; the feathers of the sides of the neck and throat are orange at base, terminating with pale blue; the feathers

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of the hind neck are light olive-green, orange at base, and terminating conspicuously with black; back, rump, and smaller wing-coverts of a brownish-rufous or bay color, the feathers narrowly edged with black; the tail-feathers are varied with dark green and blue, with their bases bright orange and their ends dirty pale orange; the terminal half of the primaries is black, the basal portion orange-yellow; the speculum on the secondaries is of a deep orange, succeeded by green and then dark blue on the outer webs to their ends; the inner webs are black; the tertials are olive-green, with the outer webs of a lighter blue; edge of the wing orange; the breast and sides are of a duller bay color than the back, and the abdomen dull olive-green; all the feathers edged with black; the under tail-coverts are dull orange, ending with green; the bill is horn-white, the end of the upper mandible dusky, and the sides with just a tinge of orange; feet dark ash.

The female does not differ essentially in plumage from the male, except that the sinciput is whiter and the throat of a clearer orange, possibly due to difference of age.

Each specimen is labelled—"Parrot. J. Kirkland, Esq., Langby Park, Dec. 15, 1877."

Fam. STRIGIDÆ.

30. Strix flammea *var.* **nigrescens**, Lawr.

"Owl. 'Jumbie Bird.'

"Length, ♀, 12 in.; alar extent, 32; wing, 10.

"There are two species, it is said; but I have seen but this one, and doubt whether there be another. Evidence from the natives should never be accepted without proof. This species is a frequenter of cliffs. I know nothing of its habits."

Fam. FALCONIDÆ.

31. Pandion haliætus (Linn.).

"Not seen, but said to appear along the coast to the windward."

32. Buteo pennsylvanicus (Wils.).

"Everywhere abundant. Called the 'Chicken Hawk'. Every specimen yet examined very light in color, except the last."

33. Urubitinga anthracina (Nitzsch)?

"'Black Hawk.'

"Length, ♂, juv., 21 in.; wing, 15; tail, 9; tarsus, 3½. Cumberland Valley, Feb. 1, 1878.

"An inhabitant of the mountains and higher valleys, feeding on crabs, cray-fishes, etc., and frequenting the mountain streams. This specimen is evidently not in mature stage of plumage. They are very shy, little seen, not molesting poultry. A young one of this species has been sent to the London Zoological Gardens.

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"One pointed out to me as the Black Hawk had the shape and appearance of the Black Vulture (*Cathartes atratus*); the short tail and peculiar flight. This not according with my observations of the hawk previously, in the forest, leads me to think that it was *C. atratus*. If so, it is the first seen. A 'Black Hawk' I had before seen had all the appearance of the American Duck Hawk. They breed on a shelf of some high cliff."

The single specimen sent is immature, but it does not agree satisfactorily with a Mexican example of *U. anthracina*, in a somewhat similar stage of plumage, and if *U. gundlachi* inhabiting Cuba is a distinct species, a comparison with that will be necessary to determine its true position.

It is (though a male) rather larger, and apparently stouter, with a shorter wing than the specimen from Mexico, which is a female; it is blacker, with the bands on the tail less in number and double the width of those on the tail of the Mexican bird; but there is probably a difference of age, and, without precise knowledge on this point, a comparison is unsatisfactory.

The specimen alluded to by Mr. Ober as having been sent to the Zoological Society of London is doubtless the one spoken of by Mr. J. H. Gurney (Ibis, 1876, p. 487); he says:—"I may also mention that a specimen of *U. anthracina* from the island of St. Vincent is now living in the Gardens of the Zoological Society; this example was in immature dress when it arrived at the Gardens, but is now in full plumage, with the exception of a slight tinge of rufous brown on the back and sides of the head, and also on the tertials," etc.

On page 488 he also remarks:—"The *Urubitinga* found in Cuba was erected into a distinct species by Cabanis, who assigned to it the specific name of *gundlachi* (*vide* Journ. für Orn. 1854, p. 80); this, however, is treated by Mr. Sharpe as a synonym of *U. anthracina*, whether correctly or not I cannot say, as I have never seen a *Urubitinga* from Cuba," etc.

Fam. FREGATIDÆ.

34. Fregata aquila (Linn.).

"A common sight is that of the 'Man-o'war Bird' flying high above the water. It breeds in numbers on the island of Balliceaux, 15 miles distant from St. Vincent."

Fam. PHÆTHONIDÆ.

35. Phæthon æthereus, Linn.

"Length, ♂, 37 in.; alar extent, 38: wing, 12½.

"Breeds in the cliffs on the Leeward coast; habits, etc., same as the Dominica bird. I found this species in great numbers, at Balliceaux, a small key near St. Vincent; found a young bird and one egg; they breed later in the season."

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Fam. PELECANIDÆ.

36. Pelecanus fuscus (Linn.).

"Length, ♂, 46 in.; alar extent, 80; wing, 20.

"Seen off the coast, but not in any abundance."

37. Sula fiber (Linn.)?

"An inhabitant of the Leeward coast."

Fam. ARDEIDÆ.

38. Ardea herodias, Linn.

"Visits the island, but not often seen; called the 'Gray Heron'."

39. Garzetta candidissima (Gm.).

"Very few ever seen."

40. Florida cærulea (Linn.).

"In small numbers."

41. Butorides virescens (Linn.).

"Length, ♀, 17 in.; alar extent, 25; wing, 7.

"Common; the only Heron plentiful."

Fam. COLUMBIDÆ.

42. Columbo corensis (Gm.).

"Length, ♀, 16 in.; alar extent, 25½; wing, 8¾.

"Abundant, but shy; inhabits the high woods. Feeds on the berries of the gommier tree and many others. Is in best condition in November and December; but most easily obtained in February and March, when the woods resound with its call notes and loud cooing. Is strictly arboreal, never touching the earth."

43. Zenaida martinicana, Bp.

"Length, ♀, 10¼ in.; wing, 5¾; tail, 3½.

"'Turtle Dove.' Balliceaux Island, near St. Vincent. Breeding abundantly.'"

44. Chamæpelia passerina (Linn.).

"Length, ♂, 6¾ in.; alar extent, 10½; wing, 3½.

"Abundant, more so than in Dominica; especially will it be found in rocky situations near the shore."

45. Geotrygon montana (Linn.).

"Length, ♂, 10½ in.; alar extent, 18; wing, 6⅛.

"Length, ♀, 9½ in.; alar extent, 16½; wing, 5½.

"Rather plentiful in the high woods, where only it resides. Is as

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strictly terrestrial as the Ramier is arboreal. Feeds on fallen seeds mostly; when alarmed, springs into a tree, or flies a short distance and alights in a low tree, whence it soon seeks the ground."

Fam. RALLIDÆ.

46. Porphyrio martinicus (Linn.).

"*Gallinula martinica?* Seen by me in October, but not obtained. One has since been shot in Dominica, and is awaiting my return there. It is undoubtedly the same species as this."

Fam. CHARADRIIDÆ.

47. Squatarola helvetica (Linn.).

"Autumn migrations."

48. Charadrius virginicus, Borkh.

"Visits the island in the months of September and October, but does not remain. There are few open fields, rounded hills, or lowlands, so that the Plover make but a very short stay."

49. Ægialitis semipalmata (Bp.).

50. Strepsilas interpres (Linn.).

"In October."

Fam. SCOLOPACIDÆ.

51. Himantopus nigricollis (Vieill.).

52. Gallinago wilsoni (Temm.).

"Only in winter months."

53. Tringa minutilla, Vieill.

54. Calidris arenaria (Linn.).

55. Gambetta flavipes (Gm.).

56. Tringoides macularius (Linn.).

"Length, ♂, 7 in.; alar extent, 12; wing, 4.

"A visitant; remains through the winter months. Some few may remain the whole year; not very plentiful."

57. Numenius longirostris (Wils.).

"Of the preceding, eight species are on the authority of a resident. There is no doubt that they occur. All are migrants, visiting only in autumn."

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Fam. LARIDÆ.

58. Sterna maxima, Bodd.

"*Sterna regia.*

"I am very sure that the Tern seen here is of this species, though I have not yet obtained it."

Fam. PODICIPITIDÆ.

59. "Podiceps?

"A species of 'diver' is often spoken of as occurring during the autumn months. I have not obtained it."

"A few ducks and one species of teal visit this island, but do not remain. There are few ponds or bodies of water, no salt-water lagoons and no marshes of any extent, so that all kinds of water fowl soon leave for better feeding grounds."

NEW YORK, *July* 22, 1878.

DESCRIPTION OF A NEW SPAROID FISH, SARGUS HOLBROOKII, FROM SAVANNAH BANK.

By TARLETON H. BEAN.

A preliminary description of this species was published in Forest and Stream. June 13, 1878. Mr. G. Brown Goode, Assistant Curator of the United States National Museum, found it on the 29th of March, 1878, in the market of Charleston, S. C., where it is known as the "Bream". Prof. D. S. Jordan has recently collected the species at Beaufort, N. C.

The description is drawn from the six specimens (United States National Museum Catalogue, Fishes, No. 20,979) sent by Mr. Goode from Charleston. These specimens range from 256 to 300 millimetres ($10\frac{1}{12}$ to $11\frac{13}{16}$ inches) in length to end of middle caudal rays. This measurement is the basis of comparison for all the rest.

The species is dedicated to John Edwards Holbrook, M. D., author of the "Ichthyology of South Carolina", &c., &c.

Sargus Holbrookii, Bean, *sp. nov.*

Body ovate, resembling *Sargus vulgaris*, Geoffr., in shape, rather than *S. caudimacula*, Poey, compressed, a very slight protuberance above the upper anterior margin of the orbit, and a very marked one in the supra-occipital region. Height of body at ventrals, measured from origin of ventral to origin of spinous dorsal, is contained slightly less than $2\frac{1}{2}$ times in length of body, and usually equals the distance of the dorsal from the end of upper jaw. Least height of tail is about equal to length of middle caudal rays, slightly exceeds the length of upper jaw, and is contained from 10 to $10\frac{1}{2}$ times in total length.

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Greatest length of head is contained $3\frac{3}{4}$ times in total length. Interorbital area is about $\frac{1}{3}$ of length of head. Snout, measuring from end of upper jaw to perpendicular through anterior margin of orbit, is $\frac{1}{10}$ of total length, and about equals mandible. Length of maxillary nearly equals length of middle caudal rays. Mandible is contained $9\frac{3}{4}$ times in total length. The eye is contained $4\frac{1}{3}$ times in head, and almost 16 times in total length.

Distance of spinous dorsal from end of upper jaw is nearly equal to height of body at ventrals. Longest dorsal spine is contained from $8\frac{1}{2}$ to 10 times in total length. The first dorsal spine does not equal the first anal, and is contained from $1\frac{1}{3}$ to 2 times in the second dorsal spine. The last dorsal spine equals longest dorsal ray. The rays of the soft dorsal gradually diminish in length from the first to the last but one, which is shorter than the last.

Distance of anal from snout is contained $1\frac{5}{8}$ times in total length. The first anal spine is usually $\frac{1}{2}$ the length of the second, which is somewhat longer and stronger than the third. The second anal spine is contained 12 times in total length. The third anal spine is, in most cases, scarcely greater than the last dorsal spine. The anal rays diminish in length to the one before the last, which does not equal the last.

The middle caudal rays are about $\frac{5}{12}$ as long as the external rays, and $\frac{1}{10}$ of total length.

The distance of pectoral from snout is contained $3\frac{1}{2}$ times and its length about 3 times in total length.

The distance of ventral from snout is about $\frac{7}{20}$ of total length. Ventral length is usually twice length of snout.

Radial Formula.—B. VI; D. XII, 13—14; A. III, 13—14; P. 15—16; V. I, 5.

Scales.—8, 60—62, 16.

Teeth.—Eight incisors in each jaw; their greatest width equal to half their length. Many small, granular teeth behind the incisors. Three rows of molars in the upper jaw; two in the lower. Two of the specimens examined show a slight tendency to increase the number of rows of molars.

Color.—Dorsal, caudal, anal, ventrals, axil of pectoral, posterior border of operculum, blackish. A black spot on the caudal peduncle, extending almost as far below as above the lateral line, and involving about eight longitudinal rows of scales. Upper part of head very dark brown. Cheeks and greater part of body dull silvery. No cross-bands. I have not seen the living fish.

Notes.—In the table of measurements, all the measurements except the first are given in hundredths of length to end of middle caudal rays.

Mr. Goode informs me that the "Bream" was abundant in Charleston market at the time of his visit, and that it met with a ready sale.

Prof. D. S. Jordan, writing from Beaufort, N. C., has kindly furnished me the following information concerning the species:—

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"There is a species of *Sargus*, very abundant here, which I take to be your *S. Holbrookii*, as I know of no other *Sargus* on our coast. ....." (From the description which Professor Jordan includes in his letter, I have no difficulty in recognizing the *Sargus* which he has observed as *S. Holbrookii*.) "This fish abounds off the wharves here. ... The fishermen call it Pinfish (Panfish?), not distinguishing it from *Lagodon*. I have obtained 50 or more specimens, all of them about 3 inches long; none over four. ..... Color silvery; bluish above; a few rather faint narrow dark bars along the sides and a broad and conspicuous dark blotch at base of caudal peduncle above, extending down the sides like a bar. Specimens seen, all small. ..... The black bar on the caudal peduncle is very conspicuous. The fish may be known by this spot when in the water."

Table of Measurements.

Current number of specimen	20,979 *a*.	20,979 *b*.	20,979 *c*.	20,979 *d*.	20,979 *e*.	20,979 *f*.
Locality	Savannah Bank, Charleston.					
Length to end of middle caudal rays....millimetres.	256	278	300	274	261	264
Body:						
Height at ventrals	.41	.41	.41½	.41	.42	.42
Least height of tail	.09½	.09⅝	.09⅝	.09½	.10	.09⅞
Head:						
Greatest length	.26⅛	.26⅞	.26⅜	.26⅛	.26⅛	.26⅛
Width of interorbital area	.08⅛	.09	.08⅛	.09	.09	.09
Length of snout	.10	.10	.10	.10⅛	.10⅛	.10
Length of maxillary	.09	.09⅛	.09⅜	.09	.09⅛	.09⅛
Length of mandible	.10	.10⅛	.10⅛	.10⅛	.10	.10⅛
Diameter of eye	.06⅛	.06⅛	.06⅛	.06⅛	.06⅛	.06⅛
Dorsal (spinous):						
Distance from snout	.41	.41⅛	.41	.39⅛	.44	.41
Greatest height	.10	.10⅛	.12	.....	.11	.10⅛
Length of first spine	.04	.04	.03⅛	.03⅛	.03⅛	.04⅛
Length of second spine	.05⅛	.....	.07	.06⅛	.06	.05⅛
Length of last spine	.07⅛	.....	.07	.....	.08	.07⅛
Dorsal (soft):						
Length of first ray	.07	.....	.....	.....	.08	.07
Length of longest ray	.07⅛	.....	.....	.....	.08	.07
Length of last ray	.06⅛	.07	.....	.....	.....	.....
Anal:						
Distance from snout	.62	.62	.60⅛	.62⅛	.62⅜	.62
Length of first spine	.....	.04⅛	.05	.04⅛	.04⅛	.04⅜
Length of second spine	.08⅛	.08⅛	.08⅛	.08⅛	.08⅛	.08
Length of third spine	.07⅜	.07⅞	.08⅛	.07⅜	.08⅛	.07⅛
Length of first ray	.07⅛	.08⅛	.08	.07⅛	.08⅛	.07⅛
Length of longest ray	.07⅛	.08⅛	.08	.07⅛	.08⅛	.07⅛
Length of last ray	.06⅛	.07	.....	.....	.06⅛	.06
Caudal:						
Length of middle rays	.09⅛	.10	.09⅛	.10	.09⅜	.10
Length of superior external rays	.24	.24⅛	.24⅜	.....	.....	.24⅛
Pectoral:						
Distance from snout	.28⅛	.28	.28	.28	.29⅛	.28
Length	.32⅛	.34	.33⅛	.31⅛	.34	.30⅛
Ventral:						
Distance from snout	.34⅛	.34⅛	.36	.35⅜	.36⅜	.35
Length	.18	.20	.21⅜	.19⅛	.20	.19
Branchiostegals	VI	VI	VI	VI	VI	VI
Dorsal	XII, 13	XII, 14	XII, 14	XII, 13	XII, 14	XII, 14
Anal	III, 13	III, 13	III, 14	III, 13	III, 13	III, 13
Pectoral	16	15	16	15	16	16
Ventral	I, 5	I, 5	I, 5	I, 5	I, 5	I, 5
Number of scales in lateral line	61	62	60	60	60	61
Number of transverse rows above lateral line	8	8	8	8	8	8
Number of transverse rows below lateral line	16	16	16	16	16	16

WASHINGTON, D. C., *August* 12, 1878.

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CATALOGUE OF CASTS TAKEN BY CLARK MILLS, ESQ., OF THE HEADS OF SIXTY-FOUR INDIAN PRISONERS OF VARIOUS WESTERN TRIBES, AND HELD AT FORT MARION, SAINT AUGUSTINE, FLA., IN CHARGE OF CAPT. R. H. PRATT, U. S. A.

The attention of anthropologists in later years has been directed very closely to the shape of the head, of the lineaments, and of the external form generally of mankind during life, instead of being confined to that of the cranium and the skeleton, and every opportunity of securing accurate casts, in plaster, of the native races of a country is eagerly embraced. The face masks made by the brothers Schlagintweit, of Asiatic tribes, are well-known standard objects in the principal ethnological collections of the world and constitute the largest single series yet brought together.

It has always been difficult to obtain face casts of the North American Indians. They manifest a deeply rooted aversion to the process required, and, indeed, a superstitious fear generally of being imitated in any manner, even by the pencil or camera. The face masks from nature now in existence have, for the most part, been taken from the dead, with the consequent lack of vital expression, and the opportunity of obtaining life-like similitudes of 64 Indian prisoners of war, of at least six different tribes, was promptly embraced by the Smithsonian Institution. No difficulty was experienced in securing these casts, as the Indians had every confidence in the statements of Captain Pratt, who had them in command, that there would be nothing detrimental to either soul or body in the process, and, indeed, he himself was first subjected to it to reassure them. In fact, understanding that the casts were destined for the city of the Great Father at Washington, there to be preserved forever, one invalid whose treatment was deferred until the last could scarcely be satisfied even with the assurance that he should not be neglected.—S. F. BAIRD.

Letter from Captain Pratt.

FORT MARION, ST. AUGUSTINE, FLA.,
February 9, 1878.

Prof. SPENCER F. BAIRD,
Smithsonian Institution, Washington, D. C.:

DEAR SIR: In reply to yours of the 23d of January, I am authorized to forward the categorical list and offenses of the prisoners, compiled from the official reports of the officers having the matter of looking up offenders in charge at Indian agencies. I have added to that list the date and place of arrest or capture, and the date of death of those who have died. To give the other information asked, I add in general some account of our later dealings with these people. This you can abridge or rearrange to your purpose.

Down to less than thirty years ago these tribes roamed without hinderance from the Platte River to the Gulf of Mexico, ranging through

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New Mexico, Eastern Colorado, the western parts of Kansas, the Indian Territory, and Texas, having little care or oversight from the government. From time to time their limits were decreased, until, in 1867, they had been given fixed reservations in the Indian Territory; the Cheyennes and Arapahoes west of the Cherokees and north of the Washita River, with hunting privileges in Western Kansas, while the Kiowas and Comanches were south of them and west of the Chickasaws, with privileges to hunt in Northwestern Texas. The opposition to abridgment of their ancient freedom required an active military force to get them within these limits. At the end of 1868, after several engagements and continued unrest from pursuit of troops, they were brought directly under care of their agents upon their reservations. The period of quiet was short. They soon commenced raiding along the frontier, more particularly on those parts they had thought their own. The few cases of punishment received in these forays from the troops or outraged border settlers were only sufficient to give them a relish. Buffalo hunters invaded their territory and angered them by a wholesale destruction of the best resource of their nomadic life. Individual Indians were not held accountable for notorious offenses, and their reservations grew to be places of refuge, from which they raided and to which they fled in comparative protection. Moving in small parties they enforced terror far into the settlements and wreaked vengeance upon the weak and isolated, not sparing women and children, whom they sometimes carried captives to their camps. This was their war, and recitals of adventure on these incursions formed a staple interest in their ceremonies and around their camp-fires. Stealing horses, mules, and cattle from settlements near was largely indulged in. This stock, if not desired for home use, found purchasers on another border or within their own limits. Sometimes the thieves were traced out and called upon to return the stock, but oftener it was clear gain. In this business they had strong competitors and much encouragement by contact and example from the bad white men who leech upon the sparsely settled districts of the frontier. The worthy settler suffered many losses from these men, who, often personating the red man, organized a system of depredations of incredible magnitude, and succeeded in attaching much additional blame on the Indians. Throughout 1870, '71, '72, and '73, things went on from bad to worse. Texas furnished their richest field, but all settlements bordering their reservations suffered; so that in these years scarcely a neighborhood but could tell of some murders or depredations. Surveying parties, emigrants, the lone settler, wagon-trains with supplies for the military, their own consumption, or traders' use, all fell under their lawlessness and barbarous rapine. The counsels and urgings of their agents and other authorities were flung to the winds.

Early in 1874 it was determined to end by force what other measures were clearly unable to stay. To this end, a day was fixed, about mid-

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summer, on which all Indians of these tribes who wished to be at peace were to come to their agencies, submit to an enrollment, such roll-calls and other oversight as might be established to hinder their absence. Those who remained out after this date were to be declared hostile and forfeit whatever rights and privileges, heretofore enjoyed, the government might determine to remove. This intention was fully published, but many were incredulous, and when the day arrived, about half each of the Kiowas and Comanches, with a greater proportion of the Cheyennes and a few Arapahoes, had accepted hostilities. They found their error when commands from Kansas, Texas, New Mexico, and the Indian Territory moved upon them simultaneously, and throughout the fall of 1874 and the subsequent winter followed them to their supposed safe retreats on the Staked Plains, or in the canyons of Red River. By spring all of the tribes named, except a few score of Quahada Comanches, were driven in about their agencies. Many were captured in the open field and sent in, while others, evading the troops, threw themselves upon the mercy of the government by surrender to the military authorities at the agencies. As fast as they were taken, or surrendered, all horses, mules, and war material were taken from them, and the warriors confined or paroled within close limits. All against whom good evidence of having committed crime could be found were taken out, and charges were alleged with a view to legal action. Another class, composed of those who were notoriously guilty of crime, but against whom no good evidence could be brought, and also of those who were notoriously insubordinate and stirrers up of bad feeling, was selected to be sent east for confinement in some fort. Not many of the first class could be found, because of difficulties in identifying, as usually, in Indian murders, none live to tell the tale, and Indian testimony is not accepted. When the time came to send them east, for some reason the first class accompanied the second, and all were sent here, where they arrived on the 21st of May, 1875.

In looking up these cases, it was found difficult to strike amiss among so many offenders. Those who accepted the position of friendship to the government by remaining at their agencies, averaged little better than the hostiles, their opposition and offenses, generally, simply antedating those of the hostiles.

Personal history sufficient for your purpose will probably be found in the list, but the charges are only alleged and not proven.

It is simply just to say that since being here these men have set an example to civilization in good behavior; twenty-two of them have learned to read and write, understandingly; while in the matter of labor, at such as could be given, they have not failed or weakened in the slightest degree.

Respectfully and sincerely yours,

R. H. PRATT,
U. S. Army.

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LIST OF INDIANS.

Number.	Museum number.	Names.		Tribe.	Rank.	Age.	Weight.		Height.	
		Indian.	English				Pounds.	Ounces.	Feet.	Inches.
1	30676	Mo-e-yan-hoy-ist	Heap of Birds	Cheyenne	Chief	49	177	.....	6	¼
2	30677	Nock-o-yo-uh	Bear Shield	....do	....do	45	140	.....	5	7¾
3	30678	Min-i-mic	Eagle's Head	....do	....do	50	195	.....	5	11¾
4	30679	Mi-huh-yeu-i-mup	Medicine Water	....do	Leader	40	139	.....	5	7½
5	30680	Cha-se-yun-nuh	Long Back	....do	Sub-chief	53	184	8	6	1½
6	30681	Ow-us-sait	White Man	....do	Warrior	24	174	.....	5	11½
7	30682	O-to-as-tuh-hos	Rising Bull	....do	....do	30	133	.....	5	5
8	30683	Co-hoe	Broken Leg	....do	....do	24	131	8	5	2¼
9	30684	Nock-ko-ist	Bear's Heart	....do	....do	26	136	8	5	9
10	30685	Ho-i-toich	Star	....do	....do	20	162	.....	5	9¼
11	30686	Ho-na-nist-to	Howling Wolf	....do	....do	27	161	.....	5	9
12	30687	O-kuh-ha-tuh	Making Medicine	....do	....do	33	145	.....	6	¼
13	30688	Wuh-ah	Antelope	....do	....do	39	152	.....	5	10½
14	30689	Come-uh-su-rah	Wolf's Marrow	....do	....do	44	137	8	5	7¾
15	30690	Ma-ha-ih-ha-chit	Little Medicine	....do	Chief	35	148	.....	5	7¼
16	30691	O-uk-ste-uh	Shave Head	....do	Warrior	23	124	8	5	9
17	30692	Wo-uh-hun-nih	Roman Nose	....do	....do	22	154	8	5	9¼
18	30693	Pa-e-yis	Big Nose	....do	....do	22	135	.....	5	6¾
19	30694	Quch-ke-i-mus	Squint Eyes	....do	....do	20	134	8	5	8¾
20	30695	Ko-wo-o-narre	Little Chief	....do	....do	23	144	8	5	10
21	30696	Chis-i-se-duh	Matches	....do	....do	21	136	.....	5	8¼
22	30697	O-e-wo-toh	Buffalo Meat	....do	....do	30	152	8	5	8
23	30698	Moh-he-wih-kio	Buzzard	....do	....do	22	172	.....	6	1
24	30699	O-uh-o	Soaring Eagle	....do	....do	26	128	8	5	7
25	30700	No-co-mis-ta	Bear Killer	....do	....do	33	148	.....	5	4¾
26	30701	No-mohst	Left Hand	....do	....do	32	141	.....	5	10¾
27	30702	Noh-hu-nah-wih	Chief Killer	....do	....do	28	131	.....	5	5¾
28	30703	Mo-chi	Buffalo Calf	....do	Squaw	34	138	8	5	6¾
29	30704	Nun-ne-ti-yuh	Packer	Arapahoe	Warrior	26	143	.....	5	9¾
30	30705	Huh-noh-uh-co-ah	White Bear	....do	....do	25	126	8	5	4¾
31	30706	Huh-nah-nee	Choctaw	Caddo	Prominent man	49	160	8	5	7½
32	30707	Isa tah	White Horse	Kiowa	Chief	30	197	8	5	11
33	30708	Wo-haw	Beef	....do	Warrior	22	133	8	5	4¼
34	30709	Ta na-ti	Bad Eye	....do	Leader	43	153	.....	5	7¼
35	30710	So-gau-se	Double Vision	....do	Chief	62	160	.....	5	8
36	30711	Sa-a-mi-a-da	Bear in the Clouds	....do	Leader	48	159	.....	5	9
37	30712	E-si-sim-ers	Lone Wolf	....do	Chief	55	162	.....	5	9¼
38	30713	Zo-tom	Biter	....do	Warrior	24	175	.....	5	7
39	30714	On-ko-cht	Ankle	Mexican	....do	28	131	.....	5	2¼

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40	30715	Ohet-toint	High Forehead	do	do	25	151	8	5	9
41	30716	E-ta-dle-uh	Boy	do	do	21	166	.....	5	10
42	30717	Zo-pe-ho	Toothless	Mexican (captured by Kiowas at 18)	do	45	133	8	5	1 1/2
43	30718	Tsah-dle-tah	White Goose	Kiowa	do	30	156	.....	5	10
44	30719	Zone-ke-uh	Teeth	do	do	20	150	.....	5	7
45	30720	Beah-ko	Old Man	Mexican (Kiowa captive at 6)	do	38	151	8	5	2 1/2
46	30721	To-na-ko-uh	Good Talk	Kiowa	do	19	145	.....	5	6
47	30722	Ko-ba	Wild Horse	do	do	29	153	.....	5	7 1/2
48	30723	Mau-ko-peh	Flat Nose	do	do	21	149	.....	5	5
49	30724	Au-lih	Wise	do	do	28	169	.....	5	10 1/2
50	30725	Ko-ho	Club Foot	Mexican (Kiowa captive at 5)	do	27	126	.....	5	3 1/2
51	30726	To-o-sape	Buffalo With Hole in its Ear	Mexican (Kiowa captive at 8)	do	45	132	.....	5	2 1/2
52	30727	Tsait-kope-ta	Bear Mountains	Cheyenne father, Pawnee mother; has lived with Kiowas 14 years.		25	166	8	5	9 1/2
53	30728	Pedro	Pedro	Mexican (Kiowa captive at 5)	Warrior	48	136	8	5	5
54	30729	Gno-yo-uh	Pile of Rocks	Comanche	do	46	186	.....	6	.....
55	30730	Pa-roo-rite	Little Prairie Hill	Mexican (Comanche captive)	do	42	133	.....	5	4 1/2
56	30731	Eck e-nah-ats	Red Antelope	do do do	do	39	137	.....	5	5 1/2
57	30732	Wy-a-ko	Dry Wood	Mexican father, Comanche mother	do	30	140	.....	5	9
58	30733	Po-ka-do-ah	Black Horse	Comanche	Chief	46	150	.....	5	8
59	30734	Nad-a-with-t		do	Warrior	26	145	.....	5	11
60	30735	Ta-a-way-te	Buffalo Scout	do	do	22	160	.....	5	7 1/2
61	30736	Po-eh-chip	Little Feather	do	do	25	155	.....	5	5 1/2
62	30737	Tischa-kah-da	Always Sitting Down in a Bad Place	do	do	31	141	.....	5	5 1/2
63	30738	Pe-ah-in	Mother	do	Woman	31	136	.....	5	3 1/2
64	30739	Ah-kes	Small Child	do	Girl	9	64	.....	3	11 1/2

The foregoing tabular statement is correct.

R. H. PRATT,
First Lieutenant Tenth Cavalry, in charge of Indian prisoners.

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NOTES ON THE PRECEDING LIST.

CHEYENNES.

30676 (1) **Heap of Birds.**—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died October 9, 1877.

Ringleader.

30677 (2) **Bear Shield.**—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Killed Watkins.

30678 (3) **Minimic.**—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30679 (4) **Medicine Water.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Charge 1st.—Wilful and deliberate murder. Did kill or assist in killing a party of surveyors, white men, consisting of Capt. Oliver F. Short and his son, F. D. Short, James Shaw and his son, J. Allen Shaw, and J. H. Renchler, residents of Lawrence, Kans. Also, Henry C. Jones.

Charge 2d.—Abduction. Illegal detention. Kidnapping. Did carry off or assist in carrying off Catherine, Sophia, Julianne, and Mary Germain, aged, respectively, 18, 13, 7, and 5½ years. Held the first two as captives from September 11, 1874, until March 1, 1875.

30680 (5) **Long Back.**—*Subchief.*

Arrested at Cheyenne Agency, Indian Territory, March 18, 1875.

Held and abused Germain girls.

30681 (6) **White Man.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Accomplice in Short and Germain murders; pointed out by Medicine Water.

30682 (7) **Rising Bull.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Accomplice in above murders; pointed out by Germain girls.

30683 (8) **Cohoe.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, January 9, 1875.

Accomplice (pointed out by Big Moccasin and Medicine Water) in Germain murder.

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30684 (9) **Bear's Heart.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Accomplice (pointed out by Big Moccasin and Medicine Water) in Germain murder.

30685 (10) **Star.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
No offence charged.

30686 (11) **Howling Wolf (Minimic's Son).**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30687 (12) **Making Medicine.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30688 (13) **Antelope.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30689 (14) **Come-uh-see-vah (Wolf's Marrow).**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30690 (15) **Little Medicine.**—*Chief.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30691 (16) **Shave Head.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30692 (17) **Roman Nose.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30693 (18) **Big Nose.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30694 (19) **Squint Eyes.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

30695 (20) **Little Chief.**—*Warrior.*
Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.
Ringleader.

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30696 (21) **Matches.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30697 (22) **Buffalo Meat.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30698 (23) **Buzzard.**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Ringleader.

30699 (24) **Soaring Eagle.**—*Warrior.*

Arrested at Fort Wallace, Kansas, December 25, 1874.

Brown murder, near Wallace. Had Brown's pistol when captured by Lieutenant Hinkle.

30700 (25) **Moconista.**—*Warrior.*

Arrested at Fort Wallace, Kansas, December, 25, 1874.

Brown murder.

30701 (26) **Left Hand.**—*Warrior.*

Arrested at Fort Wallace, Kansas, December 25, 1874.

Brown murder.

30702 (27) **Chief Killer.**—*Warrior.*

Arrested at Staked Plains, Texas, September 24, 1874.

Participated in the killing of the Germain parents and son and daughter, and in the carrying away into captivity of the four sisters.

30703 (28) **Mochi.**—*Squaw.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Put an axe in head of Germain girls' father.

Grey Beard.—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875.

Jumped from the train *en route*, near Houston, Fla., May 21, 1875, and was shot by the guard and died in two hours.

Ringleader.

Big Moocasin.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, December 14, 1874. Died November 4, 1875.

Captured by Captain Keys, and pointed out by Medicine Water.

Ringleader and murder.

Lean Bear.—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died July 24, 1875.

Ringleader.

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Shaving Wolf.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died December 5, 1876.

Ringleader.

Spotted Elk.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, April 3, 1875. Died January 2, 1877.

Ringleader.

ARAPAHOES.

30704 (29) Packer.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Charge.—Wilful murder. Killed Leon Williams, a Mexican herder in the employment of the United States Government, at Arapahoe and Cheyenne Agency.

30705 (30) White Bear.—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, March 5, 1875.

Attempt to kill. Did shoot at, with intent to kill, F. H. Williams, an employé of the United States Government, at the Arapahoe and Cheyenne Agency.

KIOWAS.

Woman's Heart.—*Chief.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874. Released by order of the Secretary of War, April 18, 1877.

Participated in the assaults on Amos Chapman and party, and on Major Syman's train, near the source of the Washita River, Texas, September 9 to 13, 1874. Participated in the murder of Jacob Dilsey, on the North Fork of the Canadian River, below Camp Supply, near Cottonwood Grove, Indian Territory, November 21, 1873.

CADDOES.

30706 (31) Huh-nah-nee.—*Prominent Man.*

Arrested at Fort Sill, Indian Territory, April 7, 1875.

Killed E. P. Osborne (Black Beaver's son-in-law) near the Wichita Agency, Indian Territory, August 22, 1874.

30707 (32) White Horse.—*Chief.*

Arrested at Fort Sill, Indian Territory, 17th December, 1874.

Led the party killing Manuel Ortego and Lucien Munós, near Dr. J. J. Sturms, on the Little Washita River, Indian Territory, August 22, 1874. Participated in the Howard's Wells Texas massacre, 1872. Led the party killing the Lee family and abducting the Lee children, near Fort Griffin,

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Texas, 1872. Led the party killing Mr. Koozier, near Henrietta, Texas, and carrying his wife and four children in captivity, 1870. Led the party attacking the mail stage, dangerously wounding the driver, robbing the stage, killing, wounding, and robbing the stage of its mules, near Johnson's Station, 25 miles west of Fort Concho, Texas, July 14, 1872. Notoriously a murderer and raider.

30708 (33) **Wo-haw (Beef).**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Participated in the murder of Manuel Ortego and Lucien Munos. Was in the party killing Jacob Dilsey.

30709 (34) **Bird Chief, *alias* Bird Medicine, *alias* Bad Eye.**—*Warrior and Leader.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Participated in the assaults on Amos Chapman and party, and Major Syman's train near the source of the Washita River, Texas, September 9 to 13, 1874. Led the party, killing Jacob Dilsey on the North Fork of the Canadian River, below Camp Supply, near Cottonwood Grove, Indian Territory, November 21, 1873. Was in the party killing J. H. Martin, Mr. Canala, and Mr. Himes near Kiowa or Medicine Lodge Creek, Barbour County, Kansas, June 16, 1874. Participated in the murder of Earnest Modest; seized Modest by the wrist and held him while another shot him, near Wichita Agency, August 22, 1874.

30710 (35) **Double Vision.**—*Petty Chief.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Was in the party murdering Earnest Modest. Held the bridle of Romero's horse all the time the murder of Earnest Modest was being accomplished.

30711 (36) **Sa-a-mi-da (Bear in the Clouds).**—*Leader.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874.

Participated in the murder of Earnest Modest. Took care of the horses of the party, while the other Indians hammered Earnest to death with their hatchets.

30712 (37) **Lone Wolf.**—*Chief.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Headed a party of Kiowas, killing two buffalo-hunters, Dudley and Wallace, on the Canadian River, below Adobe Walls, early in 1874; led a party of 100 Indians, more or less, in assailing a party of non-combatants, citizens of the United States, viz, E. P. Osborne, E. H. Barrett, Jackson Clark, and Charles Losson, and did murder, or aid in, assist,

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and abet the murder, with firearms of three of the aforesaid non-combatants, viz, Osborne, Barrett, and Clark.

30713 (38) **Zo-tom (Biter).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was in party headed by Mah-mante, killing two colored men on Salt Creek Prairie, between Jackson and Belknap, Texas, 1870 or 1871. Participated in the attack on buffalo-hunters at Adobe Walls, early in spring of 1871.

30714 (39) **On-ko-eht (Ankle).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Bad man; was with Mah-mante, killing two colored men, &c.

30715 (40) **Ohet-toint (High Forehead).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Mah-mante when he killed the man in the wagon; was with Lone Wolf killing two buffalo hunters.

30716 (41) **E-tah-dle-uh (Boy).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf killing buffalo-hunters (Dudley and Wallace); was in the party attacking buffalo-hunters at Adobe Walls, early in spring of 1874.

30717 (42) **Zo-pe-he (Toothless).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Participated in the killing of two colored men. Went to Texas with a party of Comanches and participated in the killing of two men on the Clear Fork of the Brazos in the summer of 1873.

30718 (43) **Tsah-dle-tah (White Goose).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf, killing two men, buffalo-hunters, Wallace and Dudley; was prominent in the attack on troops at the Washita, August 22, 1874; helped to kill the white men Modest, Osborne, and others.

30719. (44) **Zone-ke-uh (Teeth).**—*Warrior.*

Arrested at Salt Fork, Red River, February 18, 1875.

Was with Mah-mante killing the two colored men. Was with Lone Wolf killing two buffalo-hunters, Dudley and Wallace.

30720. (45) **Beah-ko (Old Man).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

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Helped rob Shirley's store at the Wichita Agency, Indian Territory, August 22, 1874.

30721. (46) **To-un-ke-up (Good Talk).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Stealing in Salt Creek Valley, Texas, late in 1871. Was with Lone Wolf killing Dudley and Wallace, buffalo-hunters.

30722 (47) **Ko-ba (Wild Horse).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Mah-mante stealing a lot of mules in the Brazos country in 1872. Participated in the attack on General Davidson's command at Wichita Agency, August 22, 1874.

30723 (48) **Mau-ko-peh (Flat Nose).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Stealing horses, and was with Mah-mante stealing a lot of mules in the Brazos country in 1872.

30724 (49) **Au-lih (Wise).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf killing Dudley and Wallace. Was with Mah-mante when he killed the man in the wagon. Stealing horses. Helped rob Shirley's store. Participated in the attack on General Davidson's command.

30725 (50) **Ko-ho (Kicking).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Lone Wolf killing Dudey and Wallace. Was with Mah-mante killing the two colored men. Helped rob Shirley's store. Participated in the attack on General Davidson's command. Stealing mules.

30726 (51) **To-o-sape (Bull with Holes in his Ears).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Was with Mah-mante killing the two colored men. Was with Lone Wolf killing Dudley and Wallace. Stealing mules.

30727 (52) **Tsait-kope-ta (Bear Mountain).**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Helped rob Shirley's store. Stole horses. Was with Lone Wolf killing Dudley and Wallace.

30728 (53) **Pedro.**—*Warrior.*

Arrested at Salt Fork, Red River, Indian Territory, February 18, 1875.

Killed a colored man, known as Frenchy, near the

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Wichita Agency, Indian Territory, August 22, 1874. Was in a party killing two white men below Fort Griffin, Texas, in the winter of 1872–'73. One of the men was riding a mule, and the other a horse, at the time. Was a prominent character in the party robbing Shirley's store. Stole horses and mules. Was with Mah-mante killing the man in the wagon.

Ih-pa-yah (Straightening an Arrow).—*Warrior.*

Arrested at Salt Fork, Red River, February 18, 1875. Died October 5, 1875.

Stealing horses in or near the Salt Creek Valley, Texas, in the spring of 1873.

Co-a-bote-ta (Sun).—*Warrior.*

Arrested at Sulphur Ct. H., Indian Territory, October 23, 1874. Died May 24, 1875. Participated in the murder of Jacob Dilsey.

Ah-ke-ah, *alias* **Pah-o-ka (Coming to the Grove).**—*Warrior.*

Arrested at Cheyenne Agency, Indian Territory, October 3, 1874. Released by order of Secretary of War, April 18, 1877.

Participated in the murder of Jacob Dilsey.

Mah-mante, *alias* **Swan (Man who Walks above the Ground).**—*Chief.*

Arrested at Salt Fork, Red River, Indian Territory, February 13, 1875. Died July 29, 1875.

Led a party, killing two colored men, on the Salt Creek Prairie, between Jacksboro' and Belknap, Texas, 1870 or 1871. Killed a man on the road south of Fort Griffin, Texas, some time in 1870. Two men were riding in a lone wagon, Mah-mante lay concealed and shot one. Led a party stealing a large lot of mules in the Brazos country in 1871. One mule was spotted. Killed a white woman and child in revenge for the loss of two of his men, while on a raid in Southwestern Texas, in fall of 1874. Was with Lone Wolf, killing two buffalo-hunters, Dudley and Wallace, &c.

COMANCHES.

30731 (56) Eck-e-mah-ats (Buck Antelope.)—*Warrior.*

Arrested at Elk Creek, Indian Territory, October 26, 1874.

Was in Texas with a party and stole horses about December, 1873.

30732 (57) Wy-a-ko (Dry Wood).—*Warrior.*

Arrested at Elk Creek, Indian Territory, October 26, 1874.

Has been in Texas stealing horses; was in Texas last in the winter of 1873–74.

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30733 (58) **Black Horse.**—*Chief.*

Arrested at Fort Sill, Indian Territory, March 7, 1875.

Talked defiantly in council with Governor Davis at Fort Sill, Indian Territory, 1873. Killed a white man near Fort Cobb, Indian Territory, 1867. The man went in his company on a hunt, and it was thought at the time that Black Horse procured him to go for the purpose of killing him. That the Indian Agent Leavenworth and an inn-keeper named Lewis had engaged him to do the job on account of some trouble they had had with the man, who was a bad character.

30734 (59) **Mad-a-with-t.**—*Warrior.*

Arrested at Fort Sill, Indian Territory, March 7, 1875. Died July 21, 1877.

A raider. A bad man. Always trying to persuade young men to go off into Texas, always going himself.

30735 (60) **Ta-a-way-ite (Telling Something).**—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 18, 1875.

A raider. A bad man. Always stealing horses or on a war-path. Never brings his horses to Sill. Steals them, and takes them to the Quahada Camp on the Staked Plains.

30736 (61) **Pe-eh-chip (Tail Feathers).**—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 18, 1875.

He is one of the five fellows that shot their father and was outlawed; that Captain Lee (Tenth Cavalry) was sent down to Double Mountain after, in the fall of 1873. He has been on the war-path ever since.

30737 (62) **Tis-cha-kah-da (Always Sitting Down in a Bad Place).**—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 18, 1875.

A bad man. Always off trying to steal horses, or on the war-path, &c. He is one of the desperadoes Captain Lee (Tenth Cavalry) was sent down to Double Mountain after late in 1873.

Quoi-yo-uh.—*Warrior.*

Arrested at Fort Sill, Indian Territory, April 8, 1875.

Bad man. Stealing horses. Stole thirty or more horses from the Chickasaws.

Pa-voor-ite (Little Prairie Hill).—*Warrior.*

Arrested at Wichita Agency, Indian Territory, December 25, 1874.

Helped steal forty-six horses from near Fort Sill belonging to K[iowa?] and C[omanche?] Agency and John Madden, citizen, May 11, 1874. Threatened to kill Mr. Clark, Comanches inn-keeper, on the day of the Wachita disturbance, August 22, 1874. Drew pistol on Clark.

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SYNOPSIS OF THE PEDICULATE FISHES OF THE EASTERN COAST OF EXTRATROPICAL NORTH AMERICA.

By THEODORE GILL.

The present sketch of the North American Pediculate Fishes is extracted from a general work on the fishes of the corresponding region, which it is proposed to publish in instalments and as convenience may dictate. The issue of that relative to the Pediculates seems to be at least as much called for as any other on account of the recent additions to our knowledge of the group and the rarity of the volumes in which those additions have been recorded. The recent discovery, too, of so many northern and deep-sea forms not far from our eastern coast renders it possible that any of the types herein enumerated may be found in the same waters, and the present synopsis may lead to their ready identification. The knowledge of the northern forms is chiefly due to Dr. Lütken.

Synopsis of Families.

1*a*. Branchial apertures in or behind the inferior axillæ of the pectoral fins; anterior dorsal ray superior; mouth more or less opening upwards; the lower jaw generally projecting beyond or closing in front of upper.

2*a*. Pseudobrachia with three actinosts; pseudobranchiæ not developed.

3*a*. Pectoral members geniculated, with elongated pseudobrachia; ventral fins developed ..... ANTENNARIIDÆ.

3*b*. Pectoral members not geniculated, with moderate pseudobrachia; ventral fins suppressed ..... CERATIIDÆ.

2*b*. Pseudobrachia with two actinosts; pseudobranchiæ developed.

3. Pectoral members little geniculated, but with elongated pseudobrachia; ventral fins separated by wide interval ..... LOPHIIDÆ.

1*b*. Branchial apertures in the superior axillæ of the pectoral fins; anterior dorsal ray in a cavity overhung by the anterior margin of the forehead; mouth subterminal or inferior, the lower jaw being generally received within the upper ..... MALTHEIDÆ.

ANTENNARIIDÆ.

Pediculates with elongated geniculate pseudobrachia, provided with three actinosts, *i. e.*,

Pediculates with a compressed body; the mouth opening upwards; the branchial apertures perforated in the lower axils of the pectorals; no pseudobranchiæ; the dorsals represented by (1) at least a frontal or superior rostral spine, and (2) an oblong soft dorsal; the pectoral members distinctly geniculated, with elongated pseudobrachia and three actinosts; and with well developed and approximated ventrals.

ANTENNARIINÆ.

Antennariids with the body oval and with tumid abdomen, the head compressed, the mouth quite large; teeth on the palate as well as jaws; spinous dorsal represented by three spines; soft dorsal quite elevated; and pelvic bones elongated.

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PTEROPHRYNE.*

Antennariines with skin naked and smooth; caudal peduncle free; mouth oblique; dorsal spines completely exserted; soft dorsal and anal expanded vertically; pectorals and wrists slender, and ventrals elongated.

Pterophryne histrio.

Common Frog-fish. Mouse-fish.

1758—Lophius histrio, *Linné*, Systema Naturæ, 10. ed., p. 237; 12. ed., t. 1, p. 403; Gmel. ed., t. 1, p. 1481.
1815—Lophius gibbus, *Mitchill*, Trans. Lit. and Phil. Soc. N. Y., v. 1, pl. 4, f. 9.
1837—Chironectes pictus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 393, pl. 363.
1837—Chironectes tumidus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 397.
1837—Chironectes lævigatus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 399.
1837—Chironectes nesogallicus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 401.
1837—Chironectes marmoratus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 402.
1839—Chironectes lævigatus, *Storer*, Boston Journ. Nat. Hist., v. 2, p. 383; Rep. Ich. and Herp. Mass., p. 73.
1842—Chironectes lævigatus, *DeKay*, Zoology of New York, Fishes, p. 165, pl. 27, f. 83.
1842—Chironectes gibbus, *DeKay*, Zoology of New York, Fishes, p. 164, pl. 24, f. 74.
1853—Chironectes lævigatus, *Storer*, Mem. Am. Acad. Arts and Sc., n. s., v. 5, p. 270; Hist. Fishes Mass., p. 104, pl. 18, f. 3.
1861—Antennarius marmoratus, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 185.
1863—Pterophryne lævigatus, *Gill*, Proc. Acad. Nat. Sc. Phila., [v. 15,] p. 90.
1878—Pterophryne histrio, *Gill*, Proc. U. S. Nat. Mus., v. 1, p. 216.

Pterophryne with the skin of head and body, as well as dorsal fins, emitting cutaneous tentacles, which are generally most numerous on the second and third dorsal spines and abdomen; the first dorsal spine short and filamentous with a smaller tip surmounted by a small tag; the color light for the ground, with spotted white dots and marked with blackish brown around the ocular region, with several dark radii diverging from the eyes, and on the fins more or less interrupted blackish bands, five or six obliquely crossing the soft dorsal, three rectangularly crossing the anal, and others on the pectorals, ventrals, and caudal.

An inhabitant of the Sargassum Seas, but occasional straggler to the North American coast.

CERATIIDÆ.

Pediculates non-pediculate and deprived of ventral fins, *i. e.*,

Pediculates diversiform in shape, with the mouth opening more or less upwards; the branchial apertures in the lower axils of the pectorals; no pseudobranchiæ; the dorsals represented by at least a frontal or superior rostral spine, the pectoral members not geniculated, with short pseudobrachia and three actinosts, and without ventrals.

Apparently inhabitants of the depths of the ocean in their adult condition, and, in some cases at least, near the surface in their juvenile state. All the known species are unicolored and blackish.

**Pterophryne, πτερον*, wing, *quasi* fin, and *φρυνη*, toad. If considered to be too near *Pterophrynus*, the genus may be called *Pterophrynoides* (*φρυνοειδης*, toad-like).

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Synopsis.

1*a*. Mouth moderate; cephalic spine with its basal element exserted and continuous with the distal; pyloric cœca developed (2).

2*a*. A second dorsal spine typically developed; mouth with the cleft subvertical; 1st D. with few rays; branchiæ in 2½ pairs; branchial arches unarmed; skin with scattered spinigerous scutellæ ..... CERATIINÆ.
Ceratias.

1*a*. Mouth moderate; cephalic spine with its basal element subcutaneous, procumbent, and at right or acute angle with the distal; pyloric cœca none.

2*a*. A second dorsal spine developed; branchiæ in 2½ pairs; branchial arches unarmed; body naked.

3. Body and head compressed; mouth with the cleft nearly horizontal, and mandibular articulation behind eye..... ONEIRODINÆ.
Oneirodes.

2. No second dorsal spine developed; branchiæ in ½2½ pairs; branchial arches armed with dentigerous tubercles; body with scattered tubercular scutellæ.

3. Body and head compressed; mouth with the cleft oblique; mandibular articulation under or behind eye..... HIMANTOLOPHINÆ.

4*a*. Body oblong oval; dorsal fin with about 9 rays, and pectoral with about 12?..... *Himantolophus.*

4*b*. Body short oval; dorsal fin with 4 rays, and pectoral with about 17..... *Corynolophus.*

CERATIINÆ.

Ceratiids with the body and head compressed; mouth with moderate and almost or quite *vertical* cleft; branchiæ in 2½ pairs; branchial arches unarmed; spinous dorsal represented by a rostral spine, as well as, generally, by a second, whose *basal element* is *exserted;* soft with few rays, placed quite far back of the head; pyloric cœca developed (2).

CERATIAS.*

Ceratiines with an oblong form; skin prickly; vomer toothless; cephalic spine elongated and with a simple capitate extremity; second dorsal spine well developed, and pectorals multiradiate (*i. e.*, with about 20 rays).

Ceratias Holbölllii.

1844—Ceratias Holböllii *Kroyer*, Naturhist. Tidskrift, 2. række, b. i, pp. 639–649.
1861—Ceratias Holbölli *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 205.

Ceratias with cephalic spine reclinable beyond base of caudal fin, and caudal fin longer than body exclusive of head.

Deep sea along Greenland (known from several specimens).

ONEIRODINÆ.

Ceratiids with the body and head compressed; mouth with moderate and almost *horizontal* cleft; branchiæ in 2½ pairs; branchial arches unarmed; spinous dorsal represented by a (1) rostral spine, whose basal

* *Ceratias, κερατιας, ου, ὁ,* one that has horns, in allusion to the frontal ray.

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element is procumbent and subcutaneous, and (2) *a second spine, about intermediate between the first and the dorsal fin;* soft dorsal with about 4 rays; and without pyloric cœca.

ONEIRODES.*

Oneirodinæ with oval form; the skin naked; the vomer dentigerous; and the cephalic spine with a bulbous termination, surmounted by slender filaments in several transverse rows.

Oneirodes Eschrichtii.

1871—Oneirodes Eschrichtii *Lütken*, Overs. over Dansk. Vidensk. Selsk. Forhandl., 1871, pp. 57–74; res. fr., pp. 9–18, pl. 2.

Oneirodes with the terminal element of the cephalic spine rather longer than the proximal subcutaneous; the caudal shorter than the distance between its base and the branchial apertures; and the color black except the terminal half of the spinal bulb, which is whitish.

Deep sea off Greenland: known from a single specimen 205 millimetres long.

HIMANTOLOPHINÆ.

Ceratiids with the body and head compressed, with moderate oblique cleft mouth, the mandibular articulation under the eyes; branchiæ in $\frac{1}{2}2\frac{1}{2}$ pairs; branchial arches armed with dentigerous tubercles; spinous dorsal represented *only by a rostral spine*, whose basal element is procumbent and subcutaneous; and soft dorsal with about 5—9 rays.

HIMANTOLOPHUS.†

Himantolophines of an oblong oval form, a dorsal of about 9 rays, and pectorals with about 12 rays each (?).

Himantolophus Grœnlandicus.

1857—Himantolophus Grœnlandicus *Reinhardt*, Danske Vidensk. Selsk. Nat. og Math. Afh., 4. række, b. 7, p. 74.

Himantolophus with the height of the body equal to two-fifths of the length, and the frontal ray provided with 11 tentacles (Lütken).

Habitat.—Sea off Greenland (known only from the remains of a specimen 23 inches long).

CORYNOLOPHUS.‡

Himantolophines of an abbreviated oval form, a dorsal of about 5 rays, and pectorals with about 17 rays each.

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*Oneirodes, ὀνειρώδης, dream-like, in allusion to the small and almost covered eyes.

†Himantolophus, ἱμᾶς, ἀντος, a thong, and λοφος, a tuft.

‡Corynolophus, κορῦνη, ης, "a stick with a knob at the end", or club, and λοφος, a tuft.

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Corynolophus Reinhardti.

1878—Corynolophus Reinhardti, *Lütken*, K. Dansk. Vidensk.-Selsk. Skr., Nat. og Math. Afh., 5. række, b. 5, p. 321, etc.

Corynolophus with the height of the body equal to three-fourths of the total length, and the frontal ray furnished with 8 tentacles.

Habitat.—Sea off Greenland (described from a specimen 14 inches long).

LOPHIIDÆ.

Pediculates with pseudobranchiæ, *i. e.*,

Pediculates with the body differentiated into a wide depressed head and contracted conical trunk; the mouth opening forwards and upwards; the branchial apertures in the inferior axils of the pectoral members; pseudobranchiæ; the spinous dorsal represented by a group of independent cephalic spines (3) and a small postcephalic finlet (with 3 spines); the pectoral members scarcely geniculated, but with elongated pseudobrachia, and with *three* actinosts; and with ventrals well developed.

LOPHIUS.*

Lophiids with vomerine teeth.

Lophius piscatorius.

Bellows-fish.

1758—Lophius piscatorius, *Linnæus*, Syst. Nat., 10 ed., t. 1, p. 236 (12 ed., t. 1, p. 402; Gml. ed., t. 1, p. 1479).
1815—Lophius foliatus, *Mitchill*, Trans. Lit. and Phil. Soc. N. Y., v. 1, p. 467.
1815—Lophius piscator, *Mitchill*, Trans. Lit. and Phil. Soc. N. Y., v. 1, p. 467.
1837—Lophius piscatorius, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 344, pl. 362.
1837—Lophius americanus, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 381.
1839—Lophius piscatorius, *Storer*, Boston Journ. Nat. Hist., v. 2, p. 3c0; Rep. Ich. and Herp. Mass., pp. 71, 404.
1842—Lophius americanus, *DeKay*, Zoology of New York, Fishes, p. 162, pl. 28, f. 87.
1853—Lophius americanus, *Storer*, Mem. Am. Acad. Arts and Sc., n. s., v. 5, p. 267; Hist. Fishes Mass., p. 101, pl. 18, f. 2.
1861—Lophius piscatorius, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 179.
1861—Lophius americanus, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 181 (d. s.).
1872—Lophius piscatorius, *Lyman*, 6th Ann. Rep., Inl. Fish., p. 44 (Waquoit Weir).

Lophius with a tridentate humeral spine, 11–12 rays in the dorsal fin, and the mouth behind the hyoid bone immaculate.

Habitat.—Coast waters from Newfoundland to North Carolina.

MALTHEIIDÆ.

Pediculates with the branchial apertures in the superior axils of the pectorals, *i. e.*,

Pediculates with a depressed body; the mouth subterminal or inferior, and the lower jaw generally received within the upper; the branchial apertures in the superior axils of the pectoral fins; no pseudobranchiæ;

**Lophius*, the ancient Latin name of the type of the genus.

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the spinous dorsal represented by a tentacle in a cavity overhung by the forehead, and the soft small and far behind; the pectoral members strongly geniculate, and with long pseudobrachia and three actinosts; and the ventrals well developed.

Inhabitants of temperate and tropical seas at moderate or great depths.

MALTHEINÆ.

Maltheids with a cordiform cephalic disk and a stout caudal portion, and with the frontal region elevated.

MALTHE.*

Maltheines of unique genus.

Malthe vespertilio.†

1758—Lophius vespertilio, *Linné*, Syst. Nat., 10 ed., t. 1, p. 236 (12 ed., t. 1, p. 402; Gmel. ed., t. 1, p. 1480).
1837—Malthea vespertilio, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 440.
1837—Malthæa nasuta, *Cuv & Val.*, Hist. Nat. des Poissons, t. 12, p. 452. (In part.)
1837—Malthæa notata, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 453. (In part.)
1842—Malthea nasuta, *DeKay*, Zoology of New York, Fishes, p. 167. (In part; not figure.)
1842—Malthea notata, *DeKay*, Zoology of New York, Fishes, p. 167.
1842—Malthea vespertilio, *DeKay*, Zoology of New York, Fishes, p. 167.
1861—Malthe vespertilio, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 200.

Malthe with the forehead produced into a more or less elongated subconical process, its width greater between the anterior angles of the orbit than between the posterior ones, and the frontal cavity higher than wide.

Newfoundland to West Indies.

Malthe cubifrons.

1836—Lophius (Malthe) cubifrons, *Richardson*, Fauna Bor.-Am., Fishes, p. 103, pl. 96.
1837—Malthæa nasuta, *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 452. (In part.)
1842—Malthea nasuta, *DeKay*, Zoology of New York, Fishes, p. 166, pl. 28, f. 89. (In part, *i. e.* fig., copied from Richardson.)
1861—Malthe cubifrons, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 203.

Malthe with the forehead decurved and in front with a button-like tubercle, the width between the anterior angle of the orbit nearly equal

*Malthe, μάλθη, the Greek name of a loose-bodied fish.—"Μάλθη signifie de la cire ramollie. On trouve ce nom dans Oppien parmi ceux de plusieurs grands poissons cartilagineux, et l'espèce qui le porte y est désignée comme remarquable par sa mollesse. Suidas, qui la place dans une énumération du même genre, dit qu'elle est difficile à vaincre. Sur ces deux traits Bélon a pensé que la *malthée* était la baudroie, et, bien que son opinion n'ait pas été adoptée, et n'ait peut-être pas dû l'être, M. Cuvier a cru pouvoir s'en prévaloir pour dériver de μάλθη le nom de *malthæa*, qu'il a donné à un petit genre démembré de celui des baudroies."—Cuv. et. Val.. Hist. Nat. des Poissons, t. 12, p. 438.

†Whatever may be the value of the nominal species introduced by Cuvier and Valenciennes, all those found along the United States coast, recently examined by myself, belong to one species. I think, however, that formerly I saw a second species of the *M. vespertilio* type.

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to that between the posterior ones, and the frontal cavity much broader than high.

Until lately, known from a single specimen obtained in Labrador by Audubon, the ornithologist, and now preserved in the British Museum. There is, however, a specimen in the collection of the Smithsonian Institution from St. Augustine, Florida, whence it was sent by Dr. J. M. Laing, U. S. A.

The relations of the North American genera to the other members of the families in question will be exhibited in the subsequent notes.

NOTE ON THE ANTENNARIIDÆ.

By THEODORE GILL.

The relations of the only known North American representative of the family of Antennariids to the other members of the family is exhibited in the following analytical synopsis, which is essentially the same as that published by the author in 1863. In the present synopsis, however, the most generalized forms (or those supposed to be such) are placed first and followed by those successively more aberrant or specialized. The two species hitherto retained under the generic designation *Brachionichthys* are also differentiated as distinct generic types. Dr. Lütken has recently expressed the opinion that *Pterophryne* and *Histiophryne* appear to be congeneric, but they really seem to be not even closely related.

1*a*. Head compressed; the rostral spine or tentacle as well as two other robust spines developed; soft dorsal well developed.

2*a*. Body oblong claviform; mouth comparatively small; palate unarmed; second and third spines approximated and well connected by membrane and forming a fin; pelvic bones short.....BRACHIONICHTHYINÆ.

3*a*. First dorsal spine connected with second, and third with soft dorsal fin by an incised membrane.....*Sympterichthys.*

3*b*. First dorsal spine free from second, and third from soft dorsal fin. *Brachionichthys.*

2*b*. Body oval, with tumid abdomen; mouth quite large; palate armed with teeth; second and third spines distant and not at all or scarcely connected; pelvic bones elongated.....ANTENNARIINÆ.

3*a*. First and second dorsal spines disconnected; the first filamentous, with tentacle at end.

4*a*. D. 12, A. 7. Caudal peduncle free; skin smooth or scarcely granular; mouth oblique; wrists and pectorals slender; ventrals elongated; dorsal spines free from membrane; dorsal fin more than half as long as body; anal extended downward.....*Pterophryne.*

4*b*. D. 12, A. 7—8. Caudal peduncle free; skin rough with spines; mouth vertical; wrists and pectorals widened; ventrals short; 3d dorsal spine partly immersed in skin; dorsal fin less than half as long as body; anal oblong.....*Antennarius.*

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4*c*. D. 15, A. 8. Caudal peduncle with dorsal and anal attached by membrane; skin smooth; mouth vertical; dorsal spines scarcely exserted from skin ..... *Histiophryne*.

3*b*. First and second dorsal spines connected; the first slender, but rigid, and with tentacle at end ..... *Saccarius*.

1*b*. Head cuboid; a rostral spine or tentacle only developed; soft dorsal low.

CHAUNACINÆ.

Chaunax.

The references to the original descriptions of these genera, as well as to their typical species and habitats, are indicated in the following enumeration:—

BRACHIONICHTHYINÆ.

SYMPTERICHTHYS.

Sympterichthys, *Gill*, Proc. U. S. Nat. Mus., v. 1, p. 222, 1878.
Type: Sympterichthys lævis = Lophius lævis *Lac.*
Sea near Van Diemen's Land.

BRACHIONICHTHYS.

Brachionichthys, *Bleeker*, Natuurk. Tijdschr. Nederl. Ind., t. 7, p. 121, 1854.
Type: Brachionichthys hirsutus = Lophius hirsutus *Lac.*
Sea near Van Diemen's Land.

ANTENNARIINÆ.

PTEROPHRYNE.

Pterophryne, *Gill*, Proc. Acad. Nat. Sc. Phila., [v. 15,] p. 90, 1863.
Type: Pterophryne histrio = Lophius histrio *Linn.*
Tropicalia and warm streams in floating seaweeds.

ANTENNARIUS.

Antennarius, *Commerson, Lacépède*, Hist. Nat. des Poissons, t. 1, p. 421, 1798.
Les Chironectes (Antennarius), *Curier*, Règne Animal, 1e éd., t. 2, p. 310, 1817.
Chironectes, *Cuvier*, Mém. Mus. d'Hist. Nat., t. 3, p. 418, 1817 (not Illiger).
Type: Antennarius chironectes *Comm.*
Tropicalia, in coral groves chiefly.

HISTIOPHRYNE.

Histiophryne, *Gill*, Proc. Acad. Nat. Sc. Phila., [v. 15,] p. 90, 1863.
Type: Histiophryne Bougainvillii = Chironectes Bougainvillii *Cuv. & Val.*
Unknown.

SACCARIUS.

Saccarius, *Günther*, Cat. Fishes in Brit. Mus., v. 3, p. 183, 1861.
Type: Saccarius lineatus *Gthr.*
Sea off New Zealand.

CHAUNACINAE.

CHAUNAX.

Chaunax, *Lowe*, Trans. Zool. Soc. London, v. 3, p. 339, 1846–49.
Type: Chaunax pictus *Lowe.*
Atlantic Ocean off the island of Madeira.

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ON THE PROPER SPECIFIC NAME OF THE COMMON PELAGIC ANTENNARIID PTEROPHRYNE.

By THEODORE GILL.

The most common and widely distributed of the Antennariids, and which is the peculiar species of the high seas, has been entered in the most recent systematic lists under the names *Antennarius marmoratus** and *Pterophryne picta*.† In this connection, it has been assumed that the species had first received names from Bloch and Schneider in 1801. I propose, however, to show, (1) that the species itself had long before received a name from the founder of the binomial nomenclature, and (2) that neither of the names of Bloch and Schneider is referable to these species. Long ago recognizing that the names of Bloch and Schneider had nothing to do with a *Pterophryne*, but without the bibliographical aids for certainly ascertaining what name had priority, I have hitherto adopted the provisional name *Pterophryne lævigata*, as Lütken has also recently done.

I.

It behooves us, first, to inquire what was the basis of the *Lophius histrio* of Linnæus.

In 1747, in his "Wästgöta resa förrättad år 1746", Linnæus described, as "Balistes, qvæ *Guaperva* chinenis", a small fish scarcely exceeding in length the last joint of the thumb, in the following terms, as translated in the German edition of 1765.‡

"*Balistes*, quae *Guaperva* chinensis. *Corpus* acutum, compressum. *Dorsum* antice gibbum. *Pectus* compressum, pinnis pectoralibus terminatum, prominulum. *Latera* corporis picta lituris lacteis, annularibus, interruptis, puncto centrali lacteo notatis. *Caput* magnum, thoraci immersum, dentibus minutissimis instructum. *Filamentum* subulatum, erectum, loco narium. *Pinna dorsalis anterior* retrorsum falcato-subulata, mollis, alta, e gibbere dorsi juxta caput enata, *radio* I. *Pinna dorsalis posterior* radiis 12. Pinnæ pectorales brachiorum instar manubris instructae, et antrorsum manuum instar inflexae (quod in piscibus singulare), radiis 10. *Pinnae ventrales* approximatae, radiis 5. *Pinna caudae* radiis 9. *Pinna ani* radiis 7. *Iris oculorum* alba. *Magnitudo* totius piscis vix extimum pollicis articulum superat. Diversissima species a Guaperva Ionstoni T. VI. f. 6. quam ex America possideo. Die Figur dieses Fisches in natürlicher Grösse ist die 5te auf der 3ten Tafel, wo er bey *a* von der Seite, bey *b* aber auf dem Rücken vorgestellet ist, dass die Aerme an den pinnis pectoralibus deutlich in die Augen fallen."

The acute compressed body, the round milky spots, the small rostral filament (none is represented in the figure), the well developed fins,

*Antennarius marmoratus, *Günther*, Cat. Fishes in Brit Mus., v. 3, p. 185, 1861; *Bleeker*, Atlas Ichthyologique Indes Orient. Néêrland., t. 5, p. 23, 1865.

†Pterophryne picta, *Goode*, Bull. U. S. Nat Mus., No. 5, p. 20, 1876.

‡Linné, Reisen durch Westgothland. 8vo. Halle, 1765. p. 160, S. 138.

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the five rays of the ventrals, and the white irides all better suit the common *Pterophryne* than any other Antennariid.

In 1754, in his Catalogue of the Museum of King Adolphus Frederick,* Linnæus again described, under the name "*Lophius tumidus*", evidently the same species, as follows:—

"tumidus. LOPHIUS pinnis dorsalibus tribus.
Balistes quæ Guaperua chinensis. It. W. goth. 137. t. 3. f. 5.
Guaperua. Marcgr. bras. 150. Will. icht. 50. t. E. 2. f. 2.
Habitat in Pelago inter Fucos natantes.
Corpus molle instar Ranae, adspersum ramentis cutaceis. Apertura branchiarum ad axillas brachiorum s. pone pinnas pectorales; quæ decurrit ad pulmones; alia apertura nulla, quod indicat affinitatem cum Ranis. Pinnæ in dorso tres: prima radio uno capiti insidet; altera pectori radio uno instructa; tertia dorso radiorum duodecim, quorum duo vel tres bifidi. Pectorales radiis 10, quæ ulnis s. brachiis instructæ. Ventrales radiis 5, hæ ante pectorales basi ad pectus connexæ. Ani radiis 7 bifidis. Caudae radiis 10 bifidis."

The soft body like that of a frog (and therefore naked and not rough) and the cutaneous filaments are additional characters which corroborate those given in the former work, and certify the relevancy of the descriptions to the common *Pterophryne*. The habitat is also not the least important element in the determination of the Linnæan species, inasmuch as the true *Antennarii*, so far as known, frequent chiefly coral groves, while the *Pterophryne* is a pelagic species, principally affecting the floating sea-weeds. There can then be no reasonable doubt that the Antennariid of Linnæus was the common *Pterophryne*.

In 1758, in the tenth edition of the "Systema Naturæ", Linnæus first introduced, and in 1766, in the twelfth edition, retained, the name "*Lophius histrio*", and in the synonymy of the species included references to the two works just cited. The entire passage relative to the species is as follows, in the twelfth edition (p. 403):—

"histrio. 3. L. compressus.
Chin. Lagerstr. 21. Lophius pinnis dorsalibus tribus.
Mus. Ad. Fr. I. *p.* 56. Balistes s. Guaperua chinensis.
It. wgoth. 137. *t.* 3. *f.* 5. Balistes s. Guaperua.
Marcgr. bras. 150. Guaperua.
Pet. gaz. t. 20. *f.* 6. Piscis bras. cornutus.
Will. icht. 50. *t.* E. 2. *f.* 2. Guaperua.
Osb. iter. 305. Lophius tumidus.
Habitat in Pelago inter Fucum natantem.
Pinnae D. I, I, 12. *P.* 10. *V.* 5. *A.* 7. *C.* 10."

The reference to Petiver's Gazophylacium was added in the twelfth edition.

* Musem S:ae R.ae M.tis Adolphi Friderici. Car. Linnæo. Fol. Holmiæ, 1754. p. 56.

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Although the descriptions of Linnæus are unequivocal and based solely on specimens of *Pterophryne*, in the synonymy above copied are confused several species. As he seems, however, only to have known through autopsy the species of *Pterophryne*, and to have been unprepared for the polymorphous character of the type, his confusion under the synonymy is not at all to be wondered at, and is paralleled by many modern naturalists, especially Günther. His compatriot, Osbeck, had also the same species of *Pterophryne* in view in his description* of the *Lophius histrio*, viz:—

"Die Flossquabbe, *Lophius Histrio* L. S. N. Lophius tumidus Mus. Reg. p. 56, und Linn. Westgoth. Reise Tab. 3, Fig. 3, aber der Faden und die erste Rückenflossfeder sind an den Spitzen borstig, die Borsten weich. Der ganze Körper ist mit einer schleimigen Haut, und kleinen blättrigen Stützen (*fulcris*) bedeckt, die man ausser dem Wasser kaum bemerkt, weil sie fest anschliessen. Der Rachen und Bauch sind gross, damit sie viele Krebsarten oder junge Krebse verschlingen können. Vielleicht hat die Vorsicht diesen Fisch deswegen so blättrig gekleidet, damit ihn die Raubfische mit dem Seegrasse verwechseln und nicht gar ausrotten möchten."

The smooth skin and the tag-like appendages evidently proclaim the fish of Osbeck to be a *Pterophryne*.

It is also to be remarked that the naturalist who first recognized specific differentiation among the Antennariids (Shaw), in his "General Zoology" (v. 5, p. 384, pl. 164), restricted the name to the *Pterophryne*, and gave, under the term *Lophius histrio*, a quite recognizable figure of that form, whose only great fault is the delineation of the first spine.

II.

The names subsequently applied to *Pterophryne* now demand consideration.

Those accepted by the latest systematists have been attributed to Bloch's Systema Ichthyologiæ, edited by Schneider, but, as will presently be shown, erroneously.

In the Systema Ichthyologiæ (p. 142) only one species of Antennariids is admitted under the name *Lophius histrio*, but four varieties are distinguished under it, viz:—

Var. *a*, "Striated Loph. Shaw Miscell. No. 58";
Var. *b*, *pictus*;
Var. *c*, *marmoratus*; and
Var. *d*, *ocellatus*.

As no references have been made to previous publications, except in case of var. *a*, it seems to have been generally assumed that the varietal names originated in the work in question. This, however, is not the case.

* Osbeck, Peter. Reise nach Ostindien und China. 8vo. Rostock, 1765. p. 400.

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In 1794 (as appears from the dates on the plates), Shaw published a number of his "Naturalists' Miscellany", in which he described three fishes under the generic name *Lophius*. These were designated as—

(1) *Lophius striatus* (the Striated Lophius), pl. 175;

(2) *Lophius pictus* (the Variegated Lophius), pl. 176, upper fig.; and

(3) *Lophius marmoratus* (the Marbled Lophius), pl. 176, lower fig.

The originals of these are evidently the varieties (*a*, *b*, and *c*) of *Lophius histrio* admitted by Bloch and Schneider. It is quite clear that the first two were based on species of typical *Antennarius* (not *Pterophryne*), while the third is incomprehensible, and, if the figure is at all correct, must represent a factitious fish; it most certainly has nothing to do with *Pterophryne*. The other species, however, notwithstanding the bad figures, are readily identifiable.

The *Lophius striatus* (as has recently been recognized by Günther)* is the first name of an *Antennarius* peculiar to the Pacific, and quite distinct from the Caribbean *Antennarius scaber* (= *A. histrio* Gthr.), with which it was at first confounded by Günther.†

The *Lophius pictus* was evidently based on the species or variety of *Antennarius* which was afterwards named *Antennarius phymatodes* by Bleeker, and it agrees very closely, in the distribution of colors, with a specimen figured by that ichthyologist,‡ and would probably be considered by Günther§ as a variety of his *Antennarius Commersonii*.

But whatever may be the value of the forms embraced under the name *Antennarius Commersonii* by Günther,—whether species or varieties,—the name *Antennarius pictus* must be revived from Shaw, either especially for the *Antennarius phymatodes* of Bleeker or for the collection designated as *Antennarius Commersonii*.

It has thus been demonstrated (1) that the Linnæan name *Lophius histrio* was originally created for the common *Pterophryne*, and (2) that the names generally employed for the *Pterophryne* were originally applied to very different forms, and members of even a different genus. Hence, if the laws of priority as formulated by the British and American Associations for the Advancement of Science are to guide us, there can be no question that the species of *Pterophryne* must hereafter be designated as *Pterophryne histrio*; if, however, it is allowable to go behind even the tenth edition of the Systema Naturæ, and to take the oldest binomial name, without other considerations, the designation *tumidus* must be revived. It seems best, however, to follow general usage.

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*Günther, Andrew Garrett's Fische der Südsee, v. 1, p. 162, 1876.

†Günther, Cat. Fishes in Brit. Mus., v. 3, p. 188.

‡Bleeker, Atlas Ichthyologique des Indes Orientales Néêrlandaises, t. 5, pl. 199, fig. 5, 1865.—It must be remarked that Shaw represents 5 ventral rays in his *A. pictus*, while Bleeker attributes 6 to his *A. phymatodes*.

§Günther, in Cat. Fishes in Brit. Mus., v. 3, p. 195, has referred Shaw's name to "*Antennarius multiocellatus* var. γ. = *leucosoma*", but in the "Fische der Südsee" did not refer to the *L. pictus*, and places the *L. marmoratus* as a synonym of *A. Commersonii*, having evidently transposed the names of the two.

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NOTE ON THE CERATIIDÆ.

By THEODORE GILL.

Since the publication of the third volume of Günther's "Catalogue of the Fishes in the British Museum" (1861), and the present author's Note on the Pediculati (1863), the then monotypic family of *Ceratiidæ* has received notable additions, and this year (1878) one genus or rather type of hitherto doubtful character has been substantiated, and two new allied ones added. All the representatives of the group appear to be inhabitants of the deep or open seas. The relations of the genera seem to be approximately as follows:—

Synopsis.

1*a*. Mouth moderate; cephalic spine with its basal element exserted and continuous with the distal; pyloric cœca developed (2).

2. A second dorsal spine typically developed; mouth with the cleft subvertical; 1st D. with few rays; branchiæ in 2½ pairs; branchial arches unarmed; skin with scattered spinigerous scutellæ.....CERATIINÆ.

3*a*. A second dorsal spine developed, and two fleshy tubercles behind it; pectorals with nearly 20 slender rays.....*Ceratias.*

3*b*. No second dorsal spine developed, but two fleshy claviform tubercles existing as in *Ceratias;* pectorals with about 10 slender rays....*Mancalias.*

1*b*. Mouth moderate; cephalic spine with its basal element subcutaneous, procumbent, and at right or acute angle with the distal; pyloric cœca none.

2*a*. A second dorsal spine developed; branchiæ in 2½ pairs; branchial arches unarmed; body naked.

3. Body and head compressed; mouth with the cleft nearly horizontal, and mandibular articulation behind eye.....ONEIRODINÆ.
Oneirodes.

2*b*. No second dorsal spine developed; branchiæ in ½2½ pairs; branchial arches armed with dentigerous tubercles; body with scattered tubercular scutellæ.

3*a*. Body and head compressed; mouth with the cleft oblique; mandibular articulation under or behind eye.....HIMANTOLOPHINÆ.

4*a*. Body oblong oval; dorsal fin with about 9 rays and pectoral wi h about 12?.....*Himantolophus.*

4*b*. Body short oval; dorsal fin with 4 rays and pectoral with about 17.
Corynolophus.

3*b*. Body and head depressed; mouth with the cleft vertical or inclined forwards; mandibular articulation under or in advance of snout
ÆGÆONICHTHYINÆ.
Ægæonichthys.

1*c*. Mouth enormous; (cephalic spine with its basal element subcutaneous, procumbent, and at an acute angle with its distal?).

2. No second dorsal spine developed. Mouth with the cleft subvertical. 1st D. with about 14 rays; branchiæ in 2½ pairs; branchial arches unarmed; skin naked.....MELANOCETINÆ.
Melanocetus.

CERATIINÆ.

CERATIAS.

Ceratias, *Kroyer*, Naturhist. Tidskrift, 2. række, b. 1, p. 639, 1844.

Type: C. Holbölli *Kroyer.*

Deep sea off Greenland.

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MANCALIAS.*

Mancalias, *Gill*, Proc. U. S. Nat. Mus., v. 1, pp. 227, 228, 1878.

Type: M. uranoscopus = Ceratias uranoscopus, *Murray*, *Wyville Thompson*, Voyage of the Challenger, v. 2, p. 67, with fig., 1878. (Am. ed.)

Atlantic Ocean (taken at a depth of 2,400 fathoms), between Canary and Cape Verde Islands.

ONEIRODINÆ.

ONEIRODES.

Oneirodes, *Lütken*, Overs. over d. K. Danske Vidensk. Selsk. Forhandl., 1871, pp. 56–74 (fr. pp. 9–18).

Type: O. Eschrichtii *Lütken*.

Deep sea off Greenland.

HIMANTOLOPHINÆ.

HIMANTOLOPHUS.

Himantolophus, *Reinhardt*, K. Danske Vidensk. Selsk. Nat. og Math. Afh., 4. række, v. 7, p. 74, 1837; *Lütken*, 1878.

Type: H. Grœnlandicus *Reinhardt*.

Deep sea off Greenland (adults).

CORYNOLOPHUS.

Type: Corynolophus Reinhardtii = Himantolophus Reinhardtii *Lütken*.

Deep sea off Greenland (adult), and open sea between Africa and America (young)?

ÆGÆONICHTHYINÆ.

ÆGÆONICHTHYS.

Ægæonichthys, *T. E. Clarke*, Trans. New Zealand Institute, v. 10, p. 245, 1878.

Type: Æ. Appellii *T. E. Clarke*.

Deep sea off the island of New Zealand.

MELANOCETINÆ.

MELANOCETUS.

Melanocetus, *Günther*, Proc. Zool. Soc. London, 1864, p. 301.

Type: Melanocetus Johnsonii *Günther*.

Deep sea off the island of Madeira.

In the words of Lütken,† "the general form and the physiognomy especially are quite similar in the [known] genera; common to all is, also, the absence of ventral fins, of the lateral line and its ramifications, of the air bladder, of the pseudobranchiæ, and of the teeth of the lower pharyngeal and palatine bones;‡ the smallness of the eyes and of the pectoral

Mancalias, from *mancus*, defective, with a quasi-diminutive termination, to correspond with *Ceratias*. The single specimen obtained was only 90 millimetres long.

† Vidensk. Selsk. Skr., 5. række, Naturv. og Math. Afd., 11te Bd. V, fr. tr., p. 343.

‡ In *Melanocetus*, according to Günther, "the vomer is armed with a transverse series of single teeth, and extends across the whole width of the roof of the mouth; the palatine and pterygoid teeth are situated at some distance behind the vomer, and form two bundles irregular in form"; but, according to Lütken (and since admitted by Günther), "the so-called palatine and pterygoid teeth" "belong in reality to the upper pharyngeals."

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fins, the short peduncles of the latter, the conformation of the teeth, the black color, the number of branchiostegal rays (6) as well as of the rays of the anal (4) and caudal (9), and the half-spongy consistence of the skeleton are also, apparently, characters common to all the [known] genera."

Another character shared in common by all the species, and at least as noteworthy as several of those thus enumerated by Dr Lütken, is the differentiation in the color of the extremity of the bulbiform termination of the cephalic spine. In all the known species (unless *Melanocetus* may be excepted), the apical portion or elements of the bulb are of a grayish or whitish color, and thereby quite abruptly differentiated from the rest of the spine, which is of a black color. Some special significance is probably inherent in this characteristic, and it is quite possible, if not probable, that the difference of color is expressive of a differentiation in histological structure, and that the grayish portions are phosphorescent. When the complicated "angling" apparatus of the fishes of this group is considered, it will be thought not unlikely that their power of attraction should be enhanced by a luminosity which may excite the attention or curiosity of their prey, and still more strongly tempt them within the easy reach of their capacious mouths. It is certainly scarcely likely that the characteristic in question, manifested as it is in such widely diverse types, should be a simple immaterial color feature, destitute of other significance. The not few pelagic and deep-sea animals that exhibit phosphorescence enhance the probability of the attribute suggested. The verity of the suggestion must, however, be established by histological and physiological data. It can only now be assumed that there is a teleological import in the differentiation of color, and that it is more probable that the whitish area has a phosphorescent property than that it simply serves as a relief for the filaments of the bulb. Especially is this more probable in view of the great depths which the species inhabit, and the consequently limited quantity of light which they enjoy. That the provision, whatever it may be, is an effective one, is apparent from the variety of the forms already discovered, and it seems probable that the family is not only quite characteristic of, but well represented in, the depths of the ocean.

As to *Melanocetus*, it is simply said, by Dr. Günther, to have the cephalic filament "more than half as high as the head, and dilated into a small lamella at its extremity". The "lamelliform" character of the dilatation at least requires confirmation, and it is not very unlikely that the dilatation will be found not to be thin or compressed to such an extent as to be entitled to the designation of "lamella", and that the extremity will be ascertained to be whitish. The mode of articulation of the cephalic spine also requires investigation. Dr. Lütken has corrected Dr. Günther's error of mistaking pharyngeal teeth for palatine and pterygoid, but has not elucidated the points indicated.

The several recognized genera are mostly widely differentiated,

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and represent as many as five groups, distinguished by characters which are generally indicative of at least family value; but the close agreement which they otherwise exhibit among themselves forbids separation to that extent, and yet the groups seem, at any rate, to demand distinction as sub-families. We would scarcely be prepared to believe that two genera, distinguished, one by a compressed head, and the other by a depressed head, could be so nearly related as are apparently *Himantolophus* and *Ægœonichthys*, but the modifications in question in these genera are probably expressive of the compression on the one hand, and the depression and bowing outwards on the other, at the hyomandibular articulations, and not of any fundamental osteological modifications.

With regard to the Himantolophines, there is occasion for difference of opinion, and it may be that the *Himantolophus Grœnlandicus* and *Reinhardtii* do not even differ specifically. The statements by Reinhardt as to the characteristics of the former are, however, unequivocal, and, as he appears to have been a careful and exact observer, they are probably correct, while those of Lütken regarding the latter are unquestionable. In view of the mode of variation in the family, the differences noted seem to the present author to be indicative of more than specific value, and consequently the respective species are considered as distant generic types. There is a singular agreement between the type named *Corynolophus* and the *Ægœonichthys* of the New Zealand seas in the radial formula; and while such agreement might tend to throw doubts on the actual differences supposed to exist between *Corynolophus* and *Himantolophus*, it tends far to confirm the generic value of the differences, if they really exist. It may even be that the two genera are not as closely related as are *Corynolophus* and *Ægœonichthys*, but such is scarcely probable.

The habitats given must be regarded simply as the expressions of our present state of knowledge, as it is more than probable that the ranges of most of the species are quite extensive in the bathmic zone in which they dwell. It is also probable that the number of representatives of the family will be considerably increased hereafter. A most interesting coincidence is the discovery, in the same year, of the closely related *Himantolophinæ* and *Ægœonichthyinæ* at antipodal localities. There are already, too, indications of several other types, apparently members of the family, but too imperfectly known to be introduced into the system. The present state of our knowledge in respect to such imperfectly known forms is well summarized by Dr. Lütken in the following words:—

"Les collections de petits poissons pêchés en haute mer, du Musée de Copenhague, renferment en outre quelques Lophioïdes apodes d'une taille plus petite encore (5—8^{mm}), trouvés en plein Océan Atlantique, qui annoncent peut-être l'existence d'une troisième espèce d'Himantolophe ou d'un genre voisin, et diffèrent de l'*Himantolophus Reinhardti* par le nombre des rayons (D: 6; A: 6; C: 10), probablement aussi par la

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taille moindre des adultes, puisque quelques-uns de ces embryons offrent déjà un rudiment de huppe frontale analogue à celle que possède le jeune Lophioïde, dépourvu non-seulement de ventrales, mais aussi de dorsale et d'anale, indiquant ainsi, selon toute probabilité, l'existence d'un type générique nouveau, que l'on ne tardera point à découvrir à l'état adulte, à mesure que l'étude justement commencée de la faune abyssale de l'océan aura fait de nouveaux progrès. Peut-être aussi que le "*Ceratias uranoscopus*" annoncé comme dragué par l'expédition si fameuse du "Challenger" à la profondeur surprenante de 2400 brasses, entre les îles Canaries et du Cap Vert, sera reconnu comme formant un genre à part—à en juger par une photographie (reproduite en xylographie dans "The Atlantic" de Sir Ch. Wyville-Thomson, II, p. 69), qui m'a été communiquée avec la plus grande obligeance par feu M. Willemoës-Suhm, dont la mort prématurée a été tant déplorée par ses amis et par ceux de la science.

"On trouvera dans le rapport préliminaire de M. Murray (Proc. Roy. Soc., xxiv, p. 590–94) des renseignements sur les profondeurs des huit localités où ont été dragues, lors du voyage du "Challenger" des Lophioïdes bathyphiles, en partie probablement nouveaux pour la science. Dans son rapport préliminaire sur les draguages exécutés, en 1878, dans les profondeurs du Golfe de Mexique, M. Al. Agassiz fait mention d'un poisson ressemblant à un têtard enorme à tête ronde, gigantesque, cartilagineuse et sans yeux, et de quelques autres à tête allongée et deprimée, aux yeux très petits et à filaments enormes pendant des extremités des rayons des nageoires pectorales et caudal."

NOTE ON THE MALTHEIDÆ.

By THEODORE GILL.

Since the publication of the great systematic works on fishes, the family of *Maltheidæ* has received a couple of notable additions which furnish a good idea of the range of variation occurring in the group and at the same time fully corroborate the justness of the segregation of its members under two distinct families. The distinctions thus apparent are indicated in the following analysis. All the genera are monotypic except *Malthe*.

MALTHEIDÆ.

1*a*. Body with disk cordiform and caudal portion stout; frontal region elevated, and snout more or less produced or attenuated forwards.....MALTHEINÆ. *Malthe*.

1*b*. Body with disk subcircular or expanded backwards and caudal portion slender; frontal region depressed, and snout rounded and obtuse in front. HALIEUTÆINÆ.

2*a*. Palate edentulous; rostral tentacle developed; carpus exserted from common membrane.

3*a*. Disk subtriangular; mouth small; branchiæ reduced to 2 pairs (I, 0; II, 1—1; III, 1—1; IV, 0—0)..... *Dibranchus*.

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3*b*. Disk subcircular; mouth large; branchiæ in 2½ pairs (I, 0; II, 1—1; III, 1—1; IV, 1—0).....*Halieutæa*.

2*b*. Palate dentigerous; rostral tentacle obsolete; carpus inclosed in common membrane.

3. Disk subcircular; mouth small.....*Halieutichthys*.

The genera have been made known as follows:—

MALTHEINÆ.

MALTHE.

Malthe, *Cuvier*, Règne Animal, 1e éd., t. 2, 311, 1817.
Malthea, *Cuvier & Valenciennes*, Hist. Nat. des Poissons, t. 12, p. 438, 1837.
Type: Malthe vespertilio.
Atlantic coasts of America from Brazil to Labrador.

HALIEUTÆINÆ.

DIBRANCHUS.

Dibranchus *Peters*, Monatsber. K. Akad. Wissensch. Berlin, 1875, p. 736.
Type: Dibranchus atlanticus *Peters*.
Atlantic Ocean, in deep water, near the coast of Africa.

HALIEUTÆA.

Halieutæa *Cuv. & Val.*, Hist. Nat. des Poissons, t. 12, p. 455, 1837.
Astrocanthus *Swainson*, Nat. Hist. and Class. Fishes, etc., v. 2, p. —, 1839.
Type: Halieutæa stellata *Val. & Wahl.*
Pacific Ocean, off China and Japan.

HALIEUTICHTHYS.

Halieutichthys, *Poey*, *Gill*, Proc. Acad. Nat. Sc. Phila., [v. 15,] pp. 89, 90, 1863.
Type: Halieutichthys reticulatus *Poey*.
Atlantic Ocean, off the Island of Cuba.

NOVEMBER 9, 1878.

CATALOGUE OF THE BIRDS OF ANTIGUA AND BARBUDA, FROM COLLECTIONS MADE FOR THE SMITHSONIAN INSTITUTION, BY MR. FRED. A. OBER, WITH HIS OBSERVATIONS.

By GEORGE N. LAWRENCE.

These collections were made by Mr. Ober in August and September, 1877. They were left in charge of the United States consul at Antigua, to be forwarded to Washington when an opportunity offered, and were sent soon thereafter; but from want of a proper notification or some other cause, their arrival was not known, and they were supposed to have gone astray.

In July of this year, they were ascertained to be in a public store in Brooklyn, where they had been since November, 1877.

The only bird sent of special interest is a species of Burrowing Owl from Antigua, which, on investigation, I considered to be undescribed.

The names given by Mr. Ober, with his observations, are inclosed in quotation-marks.

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From Antigua.

Fam. TURDIDÆ.

1. Margarops densirostris (Vieill.).

"Thrush.

"In the valleys among the southern hills, where are about the only rivulets and trees, we find this bird. It is not common, rather rare, and its song is heard only morning and evening; at this season little more than a call-note. Think it identical with the 'Gros Grive'—Large Thrush—of Dominica. Not yet out of moulting stage; resident."

Fam. SYLVICOLIDÆ.

2. Siurus nævius (Bodd.).

"Water Thrush.

"Rare; along a river bed among the hills, very shy; when it would perceive me, it hastily ran along a few rods, and then darted into the thicket, reappearing at some distance up or down the stream."

3. Siurus motacilla (Vieill.).

4. Dendrœca petechia (Linn.).

"Yellow Bird. Length, 5¼; alar extent, 7; wing, 2⅝.

"Not abundant; inhabits the acacia fields."

5. Setophaga ruticilla (Linn.).

"Redstart.

"Rare; seen only in the upper valleys of the southern hills. In perfect plumage and fat; evidently not a migrant. The people told me it was with them all the year."

Fam. VIREONIDÆ.

6. Vireosylvia calidris (Linn.).

"Vireo. Iris hazel.

"Found among the poisonous Manchineel trees, near the coast."

Fam. CŒREBIDÆ.

7. Certhiola dominicana, Taylor.

"Yellowbreast.

"Abundant, but not in the numbers found in Dominica."

Fam. FRINGILLIDÆ.

8. Loxigilla noctis (Linn.).

"Sparrow. Resident."

9. Phonipara bicolor (Linn.).

"Grass Bird.

"In large numbers, probably the most abundant species, sharing this honor with the Loggerhead and Sparrow Hawk."

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Fam. TYRANNIDÆ.

10. Tyrannus rostratus, Scl.

"Loggerhead. Resident.

"Extremely abundant; its cry of piperee, piperee, heard everywhere from morn till night. Old pastures its favorite haunt; but where the 'Cabbage Palm' is found (the *Oreodoya olivacea*) there the Piperee delights to stay, passing half the day perched upon the extreme tip of the terminal apex of the tree, leaving it only to chase and capture some insect flying by, or to sport a while with its mate."

Fam. TROCHILIDÆ.

11. Eulampis holosericeus (Linn.).

"Violet-breast Hummer. Rather numerous."

12. Orthorhynchus exilis (Gm.).

"Crested Hummer. Very common.

"More in the fields than the gardens; especially likes the Tamarind trees."

Fam. CUCULIDÆ.

13. Coccyzus minor (Gm.).

"Four o'clock Bird. Sparsely distributed. Resident."

Fam. STRIGIDÆ.

14. Speotyto amaura, Lawr.

"Owl. Length, ♂, 8½ in.; alar extent, 21½; wing, 6¾.

"Length, ♀, 8½ in.; alar extent, 21; wing, 6¼.

"Iris bright yellow. Called here, 'coo coo', from its hoot at night. I considered it for a time as almost mythical, reports concerning its existence were so conflicting. Some described it as a large Bat, others asserted that it was (judging from the size of its eyes) as large as a 'Guinea Bird'; all agreed that it was a night-bird, that it lived in old drains, holes in the cliffs and ruined walls; and that its hoot would strike terror to the stoutest heart.

"Like its congener of Dominica, it has a bad name; and though it may not be called here, as in Dominica, the 'Jumbie Bird' or bird of evil spirits—the name implies more than that—still it has the reputation of being a bad character. The blacks declare that it will not hesitate to tear the eyes out of any individual unfortunate enough to meet it at night. 'Me rudder see de Debbil, any time', is their forcible way of testifying to the powers, supernatural and otherwise, possessed by this poor Owl. Finding it impossible to shoot one, I offered a reward of two shillings for the first Owl brought me, and within three hours had three living birds which the men dug out of a cliff in the Chalk-hills. One that I kept two days gave frequent utterance to a chattering cry, espe-

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cially if any one approached, but it did not hoot. It feeds upon lizards and mice, it is said."

Male.—Upper plumage of a fine deep brown color, marked with roundish spots of light fulvous; the spots are smallest on the crown, hind neck, and smaller wing-coverts; they are conspicuously large on the other wing-coverts, the dorsal region, scapulars, and tertials; the quills are blackish-brown, with indented marks of pale reddish fulvous on the outer webs of the primaries, and large roundish paler spots on the inner webs; under wing-coverts reddish fulvous sparsely mottled with black; tail dark brown, of the same color as the back, crossed with four bars (including the terminal one), of light reddish fulvous, which do not quite reach the shaft on each web; bristles at the base of the bill black, with the basal portion of their shafts whitish; front white, superciliary streak pale fulvous; cheeks dark brown, the feathers tipped with fulvous; upper part of throat pale whitish buff, the lower part grayish-white, with a buffy tinge, separated by a broad band of dark brown across the middle of the throat, the feathers of which are bordered with light fulvous; the sides of the neck and the upper part and sides of the breast are dark brown, like the back, the feathers ending with fulvous, the spots being larger on the breast; the feathers of the abdomen are pale fulvous, conspicuously barred across their centres with dark brown; on some of the feathers the terminal edgings are of the same color; the flanks are of a clear light fulvous, with bars of a lighter brown; under tail-coverts fulvous, with indistinct bars of brown; thighs clear fulvous, with nearly obsolete narrow dusky bars; the feathers of the tarsi are colored like the thighs and extend to the toes; bill clear light yellow, with the sides of the upper mandible blackish; toes dull yellowish-brown.

Length (fresh), 8½ in.; wing, 6¾; tail, 3⅛; tarsus, 1½.

The female differs but little from the male in plumage; the bars on the abdomen appear to be a little more strongly defined, and at the base of the culmen is a small red spot. There are two females in the collection, the other also having the red spot; in one the tarsi are feathered to the toes, in the other only for two-thirds their length.

Length of one (fresh), 8 in.; wing, 6½; tail, 2⅞; tarsus, 1½.

Length of the other, 8½; wing, 6¼; tail, 3; tarsus, 1½.

Mr. Ridgway suggested a comparison with his *S. guadeloupensis*, the type of which belongs to the Boston Natural History Society, and by the courtesy of Dr. Brewer I have been able to make it.

Compared with *guadeloupensis*, the prevailing color is dark brown, instead of a rather light earthy-brown, and the spots on the interscapular region are much larger; it is more strikingly barred below, the other having the breast more spotted; the bars on the tail are four instead of six. In the Antigua bird each feather of the breast is crossed with but one bar, while those of the other are crossed with two.

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Mr. Ober (who arrived here November 13) informs me that he could learn of no species of Owl inhabiting Guadeloupe, nor does the museum there possess a specimen.

Fam. FALCONIDÆ.

15. Pandion haliætus (Linn.).

"Fish Hawk. Seen September 1st."

16. Tinnunculus sparverius *var.* **antillarum** (Gm.).

"Sparrow Hawk. 'Killee, Killee.'

"In large numbers all over the island. Resident."

17. Buteo pennsylvanicus (Wils.)?

"Hawk (seen), resident. Apparently same as the larger hawk of Dominica."

18. Falco?

"A large black hawk spoken of as appearing with the flocks of ducks."

Fam. FREGATIDÆ.

19. Fregata aquila (Linn.).

"Man o' war Bird.

"Resident. Plentiful in harbor of St. John's."

Fam. PELECANIDÆ.

20. Pelecanus fuscus (Linn.).

"Brown Pelican.

"Breeds abundantly on small islands off the coast. Resident."

Fam. ARDEIDÆ.

21. Garzetta candidissima (Gm.).

"'White Gaulin.' Resident.

"Everywhere abundant; frequents the dry hills and plains (feeding upon grasshoppers, lizards, &c.) in preference to the pools and moist tracts."

22. Florida cærulea (Linn.).

"'Blue Gaulin.' Resident.

"Abundant. Habits same as the preceding."

23. Butorides virescens (Linn.).

"Green Heron.

"In small numbers. Resident."

24. Ardea herodias (Linn.).

"Great Blue Heron.

"Said to arrive later in the season."

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Fam. COLUMBIDÆ.

25. Chamæpelia passerina (Linn.).

"Ground Dove. Abundant everywhere."

26. Columba leucocephala (Linn.).

"White-headed Pigeon.

"Rare among the southern hills. Think this their southern breeding limit, save perhaps Montserrat."

27. Zenaida martinicana, Bp.

"Turtle Dove. Not common among the hills."

Fam. TETRAONIDÆ.

28. Ortyx virginianus (Linn.).

"Quail."

"The pastures abandoned are fast becoming populated with quail; the acacia scrub forming agreeable shelter for them and protecting cover. So far as I can ascertain they were introduced; but at what period no one seems to know. They are now in sufficient numbers to make good sport. Think they breed at about the same season as the northern quail, as young but half-grown were plentiful in July and August."

The single specimen sent, a male, resembles most the primitive northern stock; it differs in being smaller, the skin measuring in length 8¼ inches, wing 4¼, and in having the crown and hind neck blackish, in this character resembling var. *floridanus*, but not otherwise; the transverse markings below being of the same size as those of the northern bird, which in the Florida race are twice the width.

In its upper plumage it is much like the male of *O. cubanensis* Gould (of which I have mounted specimens of both sexes), but they differ in their under plumage, the Antigua bird being like *O. virginianus*, but in *O. cubanensis* the black extends from the throat over the breast, and the feathers of the abdomen are rufous, with arrow-head markings of black and irregular tear-shaped white spots. The wing measures four inches.

The female of *O. cubanensis* has transverse markings on the under surface as in the typical form, but more strongly defined and wider; but they are not so wide as in var. *floridanus;* the crown, hind neck, and sides of the head are blackish where reddish-chestnut prevails in the northern bird; the back is grayish-ash, with no appearance of the pinkish-red, which exists in the female of *O. virginianus* on the back and on the upper part and sides of the breast.

Fam. RALLIDÆ.

29. Rallus?

"Rail. Moor-hen. Resident; plentiful apparently, but shy."

30. Fulica?

"'Coot.' Not seen; migrant."

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Fam. CHARADRIIDÆ.

31. Charadrius virginicus, Borkh.

"Golden Plover.

"Sept. 7th, first of the season; generally arrive by last of August, or first storm after Aug. 25th. First of September rarely fails to bring them, but this year no storm hastened them along and they are very late. They arrive in large flocks and spread over the pastures, hills and plains, affording exciting sport. It is not an unusual thing to bag three or four dozen in a morning. Every one owning a gun turns out, and great slaughter ensues. If suffered to remain, they would acquire fat and stay for weeks, but they soon wing their way further south.

"They are accompanied later in the season by Curlew, Yellow-legs, etc."

Fam. SCOLOPACIDÆ.

32. Himantopus nigricollis (Vieill.).

"Black-neck Stilt.

"Rare; seen early in July."

33. Gallinago wilsoni (Temm.).

"English Snipe.

"Occasionally; authority of sportsmen."

34. Ereunetes petrificatus (Ill.).

"Sandpiper.

"Abundant, in flocks of four to six, along sandy shore. Resident."

35. Symphemia semipalmata (Gm.).

"Willet. Rare."

36. Gambetta melanoleuca (Gm.).

"Yellow-legs.

"In all the salt ponds or 'fleshes'; sufficiently numerous, at times, to afford sport; said to be resident in small numbers; I found it here early in July."

37. Rhyacophilus solitarius (Wils.).

"Sandpiper.

"Not common, but seen singly in every part of the island. I shot three specimens on the summit of McNish Mountain—the highest hill—where is a spring-hole of small size. From this mountain, by the way, the entire island can be viewed, as well as the islands of Barbuda, Guadeloupe, Montserrat, Redonda, Nevis and St. Kitts—a most delightful prospect."

38. Numenius hudsonicus (Lath.).

"Curlew. Not common."

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Fam. LARIDÆ.

39. Sterna dougalli, Mont.

"Tern.

"Breeds in large numbers on the islands and rocks off shore; now finished breeding or young fully grown, though not in perfect plumage."

40. Sterna, sp.?

"A larger Tern than the above, with black back; not many seen. Resident."

41. Larus atricilla (Linn.).

"Gull. Resident."

Fam. ANATIDÆ.

42. Dafila bahamensis (Linn.).

"Duck. Resident."

From Barbuda.

Fam. TURDIDÆ.

1. Cinclocerthia ruficauda, Gould.

"Thrush. Grive."

Fam. SYLVICOLIDÆ.

2. Dendrœca petechia (Linn.).

"Yellow Warbler.

"Not plentiful. Resident; breeds."

Fam. CŒREBIDÆ.

3. Certhiola dominicana, Taylor.

"Yellow-throat. Common; resident."

Fam. FRINGILLIDÆ.

4. Loxigilla noctis (Linn.).

"Sparrow. Resident; breeds.

"Now in small flocks in the overgrown fields. Abundant."

5. Phonipara bicolor (Linn.).

"Grass-bird. Resident; breeds.

"Very familiar about yards. Abundant."

Fam. TYRANNIDÆ.

6. Myiarchus oberi, Lawr.

"Flycatcher.

"Infrequently met with in the thick laurel scrub; cry sharp at long intervals; shy."

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7. Tyrannus rostratus, Sel.
"'Loggerhead.'
"Common; resident; breeds."

Fam. TROCHILIDÆ.

8. Eulampis holosericeus (Linn.).
"Hummingbird.
"Common, especially about the prickly pear and the cacti near the beach."

6. Orthorhynchus exilis (Gm.).
"Crested Hummer.
"Most numerous. Saw only these two species, but Rev. Mr. Couley (one of the proprietors) described a larger species, visiting the island later, resembling exactly (he said) the Mango, of which he had a colored plate."

Fam. CUCULIDÆ.

10. Coccyzus minor (Gm.).
"Cuckoo; 'four o'clock bird'; not common."

Fam. FALCONIDÆ.

11. Tinnunculus sparverius *var.* **antillarum** (Gm.).
"Sparrow Hawk.
"Very common; resident; breeds."

12. Falco communis *var.* **anatum**, Bp.?
"Hawk; answers to description of Duck Hawk; arrives with the flocks of Plover, etc., forages upon the wild-ducks."

Fam. FREGATIDÆ.

13. Fregata aquila (Linn.).
"Frigate Bird.
"Resident; breeds, lays in June, some young yet in nest."

Fam. PHÆTHONIDÆ.

14. Phæthon flavirostris, Brandt.
"Tropic Bird.
"Breeds in cliffs at east end of island."

Fam. PELECANIDÆ.

15. Pelecanus fuscus (Linn.).
"Brown Pelican. Breeds."

Fam. ARDEIDÆ.

16. Ardea herodias.
"Great Blue Heron.
"Arrives with the migratory birds about Sept. 1st."

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17. Herodias egretta (Gm.)?
"A large White Heron was described to me as visiting the island."

18. Florida cærulea (Linn.).
"Small Blue Heron.
"Very numerous; resident; young white."

19. Butorides virescens (Linn.).
"Green Heron. Common; resident, breeds."

Fam. ANATIDÆ.

20. Dafila bahamensis (Linn.).
"'White throat Duck.' Resident; not common."

21. Clangula glaucion (Linn.).
"Whistler. Migrant; arrives in October."

Fam. COLUMBIDÆ.

22. Columba leucocephala, Linn.
"White-head Pigeon.
"Resident; breeds in great numbers in June and July."

23. Zenaida martinicana, Bp.?
"Turtle Dove. Extremely abundant; breeds."

24. Chamæpelia passerina (Linn.).
"Ground Dove. Exceedingly numerous; breeds."

Fam. NUMIDIDÆ.

25. Numida meleagris, Linn.
"Guinea Fowl.
"Plentiful; breeds abundantly; thoroughly wild. Introduced over one hundred years ago."

Fam. RALLIDÆ.

26. Rallus?
"Rail. Not common; resident."

27. Fulica?
"'Coot.' Migrant."

Fam. CHARADRIIDÆ.

28. Charadrius virginicus, Borkh.
"Golden Plover.
"Arrive in immense flocks first storm (N. W.) after Sept. 1st. Good shooting through September and October if weather is stormy; if fine, the bulk of them keep on."

29. Ægialitis semipalmata (Bp.)?
"Ring-neck Plover. Not common."

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Fam. SCOLOPACIDÆ.

30. Himantopus nigricollis (Vieill.).
"Black-neck Stilt. Not common. Resident."?

31. Gallinago wilsoni (Temm.).
"Snipe.
"A species not seen by me, described by Mr. Hopkins (one of the lessees of the island) as an English Snipe, in color, flight and voice; in small numbers; resident."

32. Ereunetes petrificatus (Ill.).
"Least Sandpiper.
"Resident; breeds; now in flocks of 4–6."

33. Symphemia semipalmata (Gm.).
"Willet. Common; said to breed."

34. Gambetta flavipes (Gm.).
"Yellow-legs (smaller).
"Common; resident, or nearly so."

35. Rhyacophilus solitarius (Wils.)?
"Sandpiper.
"Resident; solitary about the lagoons and fresh-water ponds."

36. Numenius hudsonicus (Lath.).
"Curlew. Resident; breeds; common."

Fam. LARIDÆ.

37. Sterna maxima, Bodd.?
"Royal Tern. Seen only."

38. Larus atricilla, Linn.
"Gull. Breeds; resident."

Fam. PODICIPITIDÆ.

39. Podilymbus podiceps (Linn.)?
"'Diver' (Grebe?).
"Think it resident, as it is irregular in its appearance and disappearance."

NEW YORK, *November* 14, 1878.

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NOTE ON PERCA FLAVESCENS.*

By Dr. FRANZ STEINDACHNER.

Dr. Franz Steindachner, in the Sitzungsberichte of the Vienna Academy for July, 1878, makes some interesting statements regarding the American Yellow Perch, of which a translation is given below:—

"*Perca flavescens* of Mitchill, Cuvier, and others, can be regarded only as a variety of *Perca fluviatilis*, and the opinion of the ichthyologists prior to Cuvier was the correct one.

The pronounced striation of the operculum, which is a characteristic of *P. flavescens*, is not always present in American specimens, and Holbrook has already remarked in his description of *Perca flavescens* (Ichthyology of South Carolina, p. 3), "with radiating striæ more or less distinct."

During my stay at Lake Winnipiseogee, New Hampshire, I frequently saw specimens with very indistinctly striated, or with perfectly smooth opercles. A much stronger argument for the identity of *Perca flavescens* with *Perca fluviatilis* lies in the fact that in the vicinity of Vienna occasional individuals with more or less strongly furrowed opercles are taken, and also in the Neusiedler Sea; in the Sea of Baikal and its tributaries I obtained several specimens with very strongly striated opercles. During my travels in England I was able to find only the typical European form of *Perca fluviatilis* with the smooth opercle.

In my opinion, only two species of *Perca* can be distinguished, namely, *Perca fluviatilis*, Linn., with two not very sharply defined varieties, viz, var. *europea* and var. *flavescens* or *americana*, and the high northern form *Perca Schrenkii*, Kessl.

In the number of longitudinal and vertical rows of scales, *Perca fluviatilis* cannot be distinguished from *P. flavescens*, both varieties having 7 to 10 (generally 7–9) scales between the base of the first dorsal spine and the lateral line, in a vertical row.

In Western North America there are known no members of *Perca* or any nearly allied genus, while in South America the rivers of Southern and Middle Chili and of Patagonia are inhabited by several (apparently only two) species of the *Perca*-like genera *Percichthys* and *Percilia*."

* Prepared by G. Brown Goode.

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ON THE DESTRUCTION OF FISH IN THE VICINITY OF THE TORTUGAS DURING THE MONTHS OF SEPTEMBER AND OCTOBER, 1878.

By Lieut. J. P. JEFFERSON, Dr. JOSEPH Y. PORTER, and THOMAS MOORE.

The following information, relative to the dying of fish in the Gulf of Mexico during the month of September last, will be found of much interest, as bearing upon the sudden destruction in large numbers of marine animals, and their accumulation in geological strata.—EDITOR.

FORT JEFFERSON, DRY TORTUGAS, FLA.,
October 16, 1878.

I have the honor to enclose herewith the skin of a fish* which was found on the beach here. I send it because many old fishermen say that they never before saw one like it. Some five or six were picked up from a multitude of other fish; and to report this great mortality among them is my principal reason for addressing you. Some three or four weeks ago, the fishing-smacks over in Florida Bay lost about all their fish in their wells, and attributed it to fresh water, which they supposed had from some cause or other come down in great volume from the mainland. On the 9th instant, the sailing-vessel which connects us with Key West met water of a dark color about midway between here and there, but saw no dead fish. On her return, on the night of the 11th, she struck it off Rebecca Shoals, about 25 miles east of here, and found it extending some 10 miles out in the Gulf. That same night it came down upon us here, and the next morning the beach and surface of the water, as far as the eye could reach, were covered with dead fish. The appearance of the water had entirely changed; instead of the usual clear blue or green, it was very dark, like cypress water, and when viewed at depths over 10 feet, was almost black, precisely like the Saint John's River. We could not perceive any change in the saltness of the water but not having any other means of determining this, had to depend upon taste. There was no appreciable change in temperature. From the fact that almost all the fish that first came ashore were small and of such varieties as frequent shoal water, I infer that the dark water must have been of less density than the sea; still, great numbers of "grouper" have been seen, and these are generally found in 3 or 4 fathoms, I believe. The destruction must have been very great, for here, on a key containing but a few acres, and with a very limited extent of beach, we have buried at least twenty cart-loads; they have come ashore in such numbers that it has been a serious matter how to dispose of them.

*This on examination by Professor Gill was pronounced to be *Aulostoma coloratum*.

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It is said that in 1856 or '57 there was a similar occurrence of limited extent over in the bay, and frequently the smacks fishing near shore along the coast meet fresh water which kills their fish; but all the fishermen here unite in saying that nothing of this kind has ever, to their knowledge, happened out on the reef. As to the extent of this I have no means of knowing; will endeavor to have forwarded with this, however, copies of the Key West papers, which will probably contain a more complete account than I have been able to give. One other fact in connection with this: among the dead fish were mullet, which, I believe, run up fresh- or brackish-water streams. Almost all the conchs around here were killed also. Whether or not sponges, coral, &c., have been affected, we have not been able to determine, the weather having been too rough to visit the beds.

I am, sir, very respectfully, your obedient servant,

J. P. JEFFERSON,
Lieutenant Fifth United States Artillery.

To Professor BAIRD.

FORT JEFFERSON, DRY TORTUGAS, FLORIDA,
November 4, 1878.

PROFESSOR: I have taken the liberty to forward you, by express from Key West, a box containing two "ribbon fish" preserved in alcohol. One of them was brought over to me by Mr. Moore, lighthouse-keeper at Loggerhead Light. The remaining specimen of "ribbon fish" in the jar (which is perfect) was picked up on a neighboring key this a. m. I am informed that these fish are a rare species, and very seldom seen.

The destruction of fish in Florida Bay and in this vicinity has been great this season. I obtained some sea-water, but not having the appliance for analyzing it, I have also taken the liberty to enclose it in the same box with the jar of fish.

Should you discover anything abnormal in the water which will account for the recent destruction of the fish in this vicinity, I will be under many obligations if you will inform me.

JOSEPH Y. PORTER,
Assistant Surgeon, U. S. Army, Post Surgeon.

P. S.—Since writing the above, Mr. Moore brought me some curious specimens of fish;* and a curious eel-like fish with but *one* eye, evidently an abnormality, has been found, which I have also enclosed in the box.

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* The following is a list of species of fishes forwarded by Dr. Porter.—EDITOR.

Aulostoma coloratum, Müll. & Trosch.
Dactylopterus volitans, (Linn.) Lac.
Ceratacanthus aurantiacus, (Mitch.) Gill.
Monacanthus pardalis, Rüpp.
Blepharichthys crinitus, (Akerly) Gill.
Belone sp. (head).

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The dark cypress looking water previously alluded to made its appearance here a day or so ago, but did not fortunately remain more than 24 hours, but during that period there was again destruction of fish.

Oct. 11th, at 7 a. m., saw the water a very dark color and dead fish drifting southwest; 9 a. m., dead fish on the beach and drifting by as far as we could see east and west of the Key.

Oct. 12th, 4 p. m., fish of all kinds on the beach, weighing from a few grains up to Jewfish, weighing about 150 lbs.

Oct. 13, 14, 15, and 16.—Dead fish drifting on this Key and at Fort Jefferson, distance from this Key 3¾ miles.

Names of some of the dead fish :—

Jewfish,	Common Garfish,
Yellow Tails,	Sucking Fish,
Mutton Fish,	Lump Suckers,
Grouper,	Muræna,
Skipjack,	Armed Enoplossus,
Runners,	Pennant's Globe Fish,
Grunts,	Horned Ostracion,
Porgie,	Great Pipe Fish,
Pogie,	Porcupine Fish,
Three-tailed Porgee,	Ribbon Fish,

and fish we call Parrot, and numberless fish I have no name for. There is a fish called Snapper that we could not find dead, and have not seen since alive up to the 27th, but the water remains quite clear.

Oct. 30 and 31.—The water colored a light brown. I do not see any fish dead or alive.

THOMAS MOORE,
Keeper of Loggerhead Light, Florida.

Canthorinus occidentalis, (Günther).
Tetrodon lævigatus, (Linn.) Gill.
Chilichthys testudineus, (L.) Müll.
Ostracium quadricorne, Linn.
Acanthurus nigricans, Linn.
Heliastes insolatus?, Cuv. & Val., = *Chromis* (*fide* Gill).
Pomacentrus leucostictus, Müll. & Troesch.
Apogon sp., probably *imberbis*.
Pareques acuminatus, (Bl. Sch.) Gill.

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DESCRIPTIONS OF SEVERAL NEW SPECIES AND GEOGRAPHICAL RACES OF BIRDS CONTAINED IN THE COLLECTION OF THE UNITED STATES NATIONAL MUSEUM.

By ROBERT RIDGWAY.

RHODINOCICHLA ROSEA.

Specimens of this species from Western Mexico, while agreeing with Central American ones in the color of the throat, breast, etc., differ very conspicuously in their upper plumage, which is a clear slate-color, the flanks almost cinereous instead of dusky black. This difference is entirely constant in the four specimens before me, compared with five of the typical form. The Northern form being unnamed, it may be characterized as follows:—

Rhodinocichla rosea, β. schistacea (Ridgw. MS.).

CH.—Above clear slate-color, the wings darker, with paler, nearly cinereous edges to the feathers; lores and auriculars dark slate; entire sides clear slate, becoming more ashy on the flanks. *Adult male:* A continuous superciliary stripe, the anterior half of which is intense rose-red, the posterior half rosy-white; chin, throat, malar region, middle of the jugulum, breast, and abdomen, and the whole crissum, pure, beautiful rose-red, most intense on the jugulum, narrower and paler on the abdomen; edge of the wing and anterior lesser coverts also pure rose-red; lining of the wing partly grayish-white. *Adult female:* Similar, but the red replaced by rich, tawny rufous, the middle of the abdomen whitish. Bill horn-yellowish, the maxilla mostly dusky; iris red (Xantus, MS.) or brown (Grayson, MS.); feet dark horn-color. Length, 8.25; wing, 3.45–3.60; tail, 3.75–3.90; bill, from nostril, .60–.65; tarsus, 1.00; middle toe, .70–.75. *Hab.*—Western Mexico (Sierra Madre of Colima, Xantus; Rio Mazatlan, Grayson).

The distinctive characters of the two forms may be contrasted as follows:—

a. rosea.—Upper parts, sides, and flanks sooty-black, the flanks scarcely paler. Wing, 3.25–3.45; tail, 3.40–3.80; bill, from nostril, .52–.60; tarsus, 1.00–1.10; middle toe, .70–.80. *Hab.*—Central America (Panama; Veragua).

β. schistacea.—Upper parts, sides, and flanks clear slate-color, the flanks almost cinereous. Wing, 3.45–3.60; tail, 3.75–3.90; bill, from nostril, .60–.65; tarsus, 1.00; middle toe, .70–.75. *Hab.*—Western Mexico.

In *R. schistacea*, the red is very slightly paler than in *R. rosea*, but the difference can be appreciated only on close comparison; the rufous in the female, however, is equally deep. The number of tail-feathers is occasionally 13, this being the number possessed by specimen 30,160. A note on the label of Colonel Grayson's male specimen is to the effect that the species is "a superb singer".

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a. rosea.

53911	U. S	♂ ad.	Panama	.....	3.45	3.80	0.60	1.00	0.70
45626	U. S	♂ ad.	Veragua (Santa Fé)	.....	3.35	3.70	0.55	1.05	0.75
.....	R. R	♂ ad.	.....do.....	.....	3.45	3.80	0.60	1.10	0.80
53910	U. S	♀ ad.	Panama	.....	3.25	3.40	0.52	1.00	0.75
45627	U. S	♀ ad.	Veragua (Santa Fé)	.....	3.25	3.75	0.52	1.05	0.75

β. schistacea.

30160	U. S	♂ ad.	Sierra Madre, Colima	Apr. —, 1863	3.45	3.90	0.60	1.00	0.70
34057	U. S	♂ ad.	Mazatlan	June —, 1862	3.50	3.80	.....	1.00	0.70
30161	U S	♂ ad.	Sierra Madre, Colima	Apr. —, 1863	3.60	3.75	0.65	1.00	0.75
34058	U. S	♀ ad.	Mazatlan.....	June —, 1862	3.45	3.75	.....	1.00	0.70

EMBERNAGRA RUFIVIRGATA, Lawr.

Specimens from Merida, Yucatan, of which there are three before me, differ from all other Mexican examples in the collection, as well as those from Texas, in the very sharp definition and dark color of the stripes on the crown, these being a very dark brown—almost black—anteriorly, the broad stripe between a pure ash-gray, without a trace of olivaceous tinge. The bill is also very much darker in color, the maxilla being quite black in some examples, while the feet are also of a darker brown color. In the light grayish color of the flanks and the very pale buff of the crissum, these Merida examples agree much more closely with Texas specimens than those from Mexico.

Mexican examples are like those from Texas in the character of the head-stripes and in the color of the bill and feet, but they are very different in their lower plumage, not only from the true *rufivirgata*, but also from the Yucatan race, the flanks being a dark raw-umber tint, or deep drab, almost like the back, and in strong contrast with the white of the abdomen, while the crissum is of a deep fulvous, or dark grayish-buff.

It thus appears that three well-marked geographical races of this species may be defined, their characters being as follows:—

A. Maxilla reddish-brown; legs and feet pale brown. Stripes of the head not sharply defined, uniform reddish umber-brown, the broad vertical stripe olive-green throughout, or only tinged with ash anteriorly.

a. rufivirgata.—Bill slender, its depth .25, the length of the maxilla from the nostril to the tip being .35–.38. Flanks pale grayish-buff, or light grayish-fulvous; crissum pale buff. Wing, 2.60–2.65; tail, 2.50–2.70; tarsus, .90–.95; middle toe, .60. *Hab.*—Rio Grande Valley of Texas.

β. crassirostris.—Bill very stout, its depth .28–.33, the length of the maxilla from the nostril to the tip being .35–.40. Flanks deep drab, or raw-umber brown; crissum deep fulvous. Wing, 2.55–2.75; tail, 2.30–2.70; tarsus, .85–.90; middle toe, .58–.65. *Hab.*—Mexico.

B. Maxilla dark brown, or brownish-black; legs and feet deep brown. Stripes of the head sharply defined, black anteriorly, chestnut mixed with black posteriorly, the broad vertical stripe clear ash-gray throughout.

γ. verticalis.—Bill slender, as in *rufirgata*, its depth being .26–.28; its length from the nostril .35–40. Flanks and crissum pale, as in *rufivirgata*. Wing, 2.50–2.68; tail, 2.60–2.80; tarsus, .85–.95; middle toe, .60. *Hab.*—Merida, Yucatan.

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Following is a list of the specimens examined:—

a. rufivirgata.

					Wing.	Tail.		Tarsus.	Middle toe.
.....	R. R.....	♂ ad.	Texas.....	.....	2.60	2.50	0.38×0.25*	0.90	0.60
.....	R. R.....	♂ ad.	.....do.....	Mar. 28, 1876	2.65	2.70	0.35×0.25	0.95	0.60

* The first number indicates the length of the bill from the nostril; the second, its depth through the base.

β. crassirostris.

.....	G. N. L..	♂ ad.	Cordova.....	.....	2.75	2.85	0.40×0.32	0.90	0.60
29229	U. S.....	♀ ad.	Orizaba.....	May 4, 1858	2.55	2.40	0.35×0.30	0.85	0.65
22443	U. S.....	♂ ad.	"Mexico".....	.....	2.53	2.70	0.38×0.33	0.90	0.65
23890	U. S.....	♀ ad.	Venado Island, W. Mex.†	June —, 1861	2.60	2.30	0.35×0.28	0.90	0.58

† This specimen is somewhat intermediate in coloration between *rufivirgata* and *crassirostris*, but seems decidedly nearer the former. It differs from both, however, in the very sharp definition of the stripes on the head, which, however, are clear, uniform chestnut, and in the bright buff *yellow* cast of the crissum and tibia. It is quite possible that this specimen, which is not in good condition, may represent a fourth race, peculiar to Western Mexico.

γ. verticalis.

39222	U. S.....	♀ ad.	Merida, Yucatan.....	May 25, 1865	2.50	2.60	0.35×0.26	0.85	.....
37894	U. S.....	♂ ad.	.....do.....	Feb. 28, 1865	2.60	2.80	0.40×0.28	0.90	0.60
.....	R. R.....	♀ ad.	.....do.....	Mar. 19, 1865	2.68	2.75	0.40×0.28	0.95	0.60

Following are the chief references to this species:—

a. rufivirgata.

Embernagra rufivirgata, LAWR., Ann. Lyc. N. Y. April 28, 1851, 112, pl. v, fig. 2 (Rio Grande, Texas).—BAIRD, B. N. Am. 1858, 487 (Ringgold Barracks, Texas; Nuevo Leon, N. E. Mexico); Mex. Bound Survey, II, Birds, 1859, 16, pl. xvii, fig. 2; Cat. N. Am. B. 1859, No. 373.—BUTCHER, Pr. Ac. Nat. Sci. Phil. 1868, 150 (Laredo, Texas).—COUES, Key, 1872, p. —; Check List, 1873, No. 209.—B. B. & R. Hist. N. Am. B. II, 1874, 47, pl. xxviii, fig. 3.—MERRILL, Bull. Nutt. Orn. Club, I, Nov. 1876, 89 (Ft. Brown, Texas; descr. nest and eggs); Proc. U. S. Nat. Mus. I, 1878, p. 128 (Ft. Brown, Tex.; biogr.).—SENNETT, Bull. U. S. Geol. and Geog. Survey Terr. IV, No. 1, 1878, 22 (Brownsville and Hidalgo, Texas; common).

Brown-striped Olive Finch, LAWR., *l. c.*

Texas Finch, BAIRD, *l. c.*

Green Finch, COUES, *l. c.*

β. crassirostris.

? "*Zonotrichia plebeja*, LICHT.", BONAP., Compt. Rend. XLIII, 1856, 413.*

"*Embernagra rufivirgata*", SCL., P. Z. S. 1856, 306 (Cordova); 1859, 380 (Playa Vicente); Catal. 1861, 117, No. 709 (Orizaba).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 22 (Huemelula, Isth. Tehuantepec).—SUMICHR., Mem. Bost. Soc. I, 1869, 551 (Vera Cruz; temp. and hot reg., up to 1,200 metres).

Embernagra rufivirgata var. *crassirostris*, BAIRD, MS.

γ. verticalis

"*Embernagra rufivirgata*", LAWR., Ann. Lyc. N. Y. IX, 1869 (Merida, Yucatan).

* I have at present no means of verifying this reference, and therefore adopt, provisionally at least, Professor Baird's MS. name of *crassirostris*.

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LOXIGILLA VIOLACEA.

A specimen of this species from the Bahamas differs from Jamaican examples in larger bill and feet and much more intensely black plumage; the chestnut-red of the throat, etc., being also deeper and richer. These differences being probably geographical, the Bahaman form seems entitled to a distinctive name, and I therefore propose that of *bahamensis*.

The characters of the two races may be defined as follows:—

a. violacea.—Plumage of the body more or less decidedly slaty posteriorly; lining of the wing white. Throat, eyebrow, and crissum bright cinnamon-rufous. Wing, 3.00–3.30; tail, 2.90–3.20; bill, from nostril, .40–.45; depth of bill, .40–.48; tarsus, .70–.80; middle toe, .55–.60. *Hab.*—Jamaica.

β. bahamensis.—Plumage of the body lustrous black posteriorly; lining of the wing dark grayish. Throat, eyebrow, and crissum rich purplish rufous. Wing, 3.25; tail, 2.95; bill, from culmen, .45; depth of bill, .50; tarsus, .85; middle toe, .65. *Hab.*—Bahamas. (Type, 74,707, Nat. Mus. Bahamas; Dr. Bryant.)

a. violacea.

74711	U. S.....	♂ ad.	Jamaica.....	Feb. —, 1865	3.30	3.20	0.45×0.48	0.80	0.60
.....	R. R.....	♂ ad.	.....do.....	(?)	3.00	2.90	0.40×0.40	0.70	0.55
1800	R. R.....	♀ ad.	.....do.....	Aug. 8, 1859	3.10	3.00	0.42×0.40	0.80	0.60

β. bahamensis.

74707	U. S.....	♂ ad.	Bahamas.....	(?)	3.25	2.95	0.45×0.50	0.85	0.65

ANAS ABERTI (Ridg., MS.).

SP. CH.—*Adult female:* Size of *Querquedula discors* and *cyanoptera*, but in coloration closely resembling *A. fulvigula*. Prevailing color ochraceous-buff, but this everywhere relieved by brownish-black spots or streaks. Head, neck, and lower parts streaked, the streaks finest on the neck and sides of the head, broadest on the jugulum and crissum, which is somewhat tinged with rusty, and assuming the form of oblong spots on the abdomen, thighs, and anal region; throat immaculate. Back, scapulars, and rump with the blackish predominating; the feathers bordered with ochraceous; those of the back and the scapulars with irregular indentations and occasional bars of the same. Lesser wing-coverts brownish-slate, bordered with dull earthy-brown; middle coverts with their exposed portion velvety-black, forming a distinct bar. Secondaries widely tipped with pure white (forming a conspicuous band about .35 of an inch wide), this preceded by a velvety-black bar of about equal width, the basal half or more (of the exposed portion) consisting of a metallic speculum of dark grass-green, varying to blue and violet in certain lights. Tertials opaque velvety-black exteriorly, the inner webs brownish-slate; primary-coverts and primaries brownish-slate, the latter edged with lighter. Tail brownish-gray, the feathers

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edged and coarsely spotted with light buff. Bill light yellowish-brown, darker on the culmen, the unguis dusky; feet light yellowish (probably orange in life). Wing, 8.50; tail, 3.25; culmen, 1.65; greatest width of the bill, .60; depth of maxilla through the base, .50; tarsus, 1.30; middle toe, 1.70.

Type, No. 12,789, U. S. Nat. Mus.; Mazatlan, Mexico; Colonel Abert.

REMARKS.—This remarkable little duck is very different from any other species known to me. In its small size, and, to a certain extent, the narrow bill, it is like the species of *Querquedula*, but its coloration calls instantly to mind the *Anas fulvigula* from Florida, and the species from the Sandwich Islands, recently described by Mr. Sclater. The specimen is marked as being a female, so it is possible that the male may be more brilliant in plumage.

In addition to the characters given above, it may be mentioned that there is a distinct indication of a narrow, dusky, postocular streak, and of a wider and less distinct loral stripe, thus separating a light superciliary stripe from the light color of the cheeks. The lining of the wing and the axillars are pure white, the latter with a segregation of dusky spots near the carpo-metacarpal joint.

In the collection of the National Museum, there is a female specimen of the recently described *Anas wyvilliana* of the Sandwich Islands. Mr. Sclater's description was fortunately seen just in time to prevent the renaming of the species. Since Mr. Sclater describes only the male, however, a description of the opposite sex, which seems to differ but little in coloration, may not be out of place in this connection:—

ANAS WYVILLIANA, Sclater.*

Adult female: Smaller than *A. boschas* or *A. obscura*, but somewhat resembling the female of the former in plumage, being much darker, however. Prevailing color a mixture of rusty ochraceous and brownish dusky, the latter predominating on the upper surface, the former on the lower, the abdomen considerably paler. Eyelids pure white, forming a distinct but narrow orbital ring. Head and neck finely and densely streaked with blackish and pale ochraceous, the pileum nearly uniform blackish; jugulum and breast with broad crescentic or U-shaped marks of dusky, each enclosing a cuneate or oblong longitudinal spot of the same along the shaft; abdomen and anal region thickly spotted with lighter grayish-brown; flanks with markings similar to those on the breast, but much larger; crissum strongly tinged with bright rusty, the larger feathers uniform black towards ends. Back and scapulars dusky, the feathers with ochraceous borders, enclosing another V- or U-shaped mark of the same; rump blackish, the feathers with only the external ochraceous border; upper tail-coverts blackish, marked much like the scapulars, only more irregularly. Tail brownish-slate, the feathers edged with whitish, and with three or four narrow bars of pale

* P. Z. S. Mar. 19, 1878, p. 350.

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buff (V-shaped) on each feather, more apparent on the outer rectrices. Lesser wing-coverts dark grayish-brown, distinctly bordered with dull ochraceous; middle coverts with the concealed portion brownish-gray; this succeeded by a paler grayish shade, the most of the exposed portion being opaque velvety-black, forming a distinct broad band; secondaries metallic dark bluish-green, changing to blue and violet, this succeeded by a subterminal band of opaque velvety-black, about .25 in width, and this by a terminal band of pure white of the same width; outer webs of the two lower tertials opaque black, the rest grayish-brown, more brown on outer webs; primaries brownish-slate, with slightly paler edges. Bill dusky (probably dark olivaceous in life); legs and feet light yellowish-brown (probably orange in life). Wing, 9.00; tail, 3.65; culmen, 1.75; greatest width of bill, .68; depth of maxilla, through base, .55; tarsus, 1.40; middle toe, 1.70. [Described from No. 20,319 U. S. Nat. Mus.]

Unlike the somewhat similar species from Mazatlan (*A. aberti*), as well as the female of *A. boschas* and both sexes of *A. fulvigula*, the whole throat is densely streaked, like the neck. The entire lining of the wing, with the axillars, is pure white, as in allied species.

Gray's *Hand-list* quotes, under *A. boschas*, an "*A. freycineti*, Bp.", with the locality "Sandwich I." standing opposite. No indication is given, however, as to where Bonaparte's bird is described, and I have been unable to find any further clue. Should the locality of "*A. freycineti*" be the Sandwich Islands, it is very probable that this is the same species.

The female of *A. wyvilliana* scarcely needs comparison with that of *A. boschas*. It is much smaller, the colors altogether darker, the speculum green instead of violet, and preceded by a wide *black* instead of a wide *white* bar. The white ocular ring is also a peculiar feature.

NOVEMBER 18, 1878.

DESCRIPTION OF TWO NEW SPECIES OF BIRDS FROM COSTA RICA, AND NOTES ON OTHER RARE SPECIES FROM THAT COUNTRY.

By ROBERT RIDGWAY.

A small collection of birds brought from Costa Rica by Mr. José C. Zeledon includes several exceedingly rare and interesting species, among which may be mentioned a young male of *Carpodectes nitidus*, a second specimen of *Porzana cinereiceps*, Lawr., the recently described "*Zonotrichia*" *vulcani*, and *Phænoptila melanoxantha*, besides *Pyrgisoma capitalis*, *Panterpe insignis*, *Geotrygon costaricensis*, etc. In addition to the above are the two following, which are believed to be undescribed:—

1.—THRYOPHILUS ZELEDONI (Lawrence, MS.).

SP. CH.—Wing, 2.50–2.60; tail, 2.15–2.45; bill, from nostril, .48–.50; tarsus, 1.00; middle toe, .62–.65.

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Above brownish-slate, becoming more olivaceous on the rump, upper tail-coverts, and tail. Remiges with very indistinct (scarcely observable) darker bars. Tail heavily but somewhat irregularly barred with dusky black, the black bars about as wide as the interspaces. A sharply defined and conspicuous superciliary stripe of white; a wide stripe of brownish-slate (like the crown) along upper half of the auriculars. Chin, throat, cheeks, and lower parts in general grayish-white, with a faint grayish wash across the jugulum, more distinct on the sides of the breast. Flanks, anal region, and crissum light fulvous. Lining of the wing grayish-white. [Type in Mus. R. R.]

This well-marked species, although perhaps most like *T. modestus* (Cabanis.), is very distinct from that bird. The size is much greater, the plumage altogether grayer, and the bars on the tail broader and more sharply defined. Their characters may be more precisely contrasted, as follows:—

T. modestus.—Wing, 2.30; tail, 2.25–2.35; bill, from nostril, .40–.45; tarsus, .80–.90; middle toe, .52–.58. Above, grayish-umber, becoming gradually more grayish on the pileum. Tail cinnamon-umber, with narrow and rather indistinct bars of blackish less than half as wide as the interspaces. Lower parts buffy-white, without grayish shade across the jugulum; sides, flanks, and anal region, and crissum deep ochraceous. *Hab.*—Highlands of Costa Rica.

T. zeledoni.—Wing, 2.50–2.60; tail, 2.15–2.45; bill, from nostril, .48–.50; tarsus, 1.00; middle toe, .62–.65. Above, brownish-slate, more olivaceous posteriorly. Tail grayish-brown, with broad and sharply defined bars of blackish, equal in width to the interspaces. Lower parts grayish-white, with a distinct grayish shade across the jugulum; flanks, anal region, and crissum light grayish-fulvous. *Hab.*—Atlantic lowlands of Costa Rica.

2.—PSEUDOCOLAPTES LAWRENCII (Ridgway, MS.).

Sp. ch.—Wing, 4.15–4.35; tail, 4.15–4.30; bill, from nostril, .50; tarsus, 1.00–1.05; middle toe, .68–.70. Primaries, primary-coverts, greater and middle wing-coverts brownish-black, the first more brownish; both rows of wing-coverts tipped with bright ochraceous. Tufts on sides of neck creamy buff.

Adult: Pileum, nape, and auriculars brownish-black, streaked with rusty-fulvous; nape more conspicuously streaked with light fulvous or buff; a narrow superciliary streak of buff. Back, scapulars, lesser wing-coverts, and tertials ferrugineous, the feathers of the back very indistinctly bordered terminally with dusky. Rump, upper tail-coverts, and tail bright brick-rufous, immaculate. Chin, throat, and sides of the neck creamy-buff, the latter deepest, and immaculate; the throat faintly barred with dusky; jugulum and breast light buff, the feathers bordered with dusky, producing a conspicuously striped appearance—the dusky prevailing laterally, the buff medially; middle of the abdomen plain deep buff. Sides and flanks ferrugineous, considerably lighter than the back; crissum plain rusty-ochraceous. Bill blackish, the gonys whitish. Feet horn-color (greenish-olive in life). Iris dark brown.

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Immature: Similar, but pileum and auriculars plain brownish-black; chin and throat more heavily marked (squamated) with dusky, and sides brighter rufous. Superciliary streak obsolete, except above the auriculars.

Hab.—La Palma and Navarro, Costa Rica (altitude about 3,500–5,000 feet).

The most striking characters of the two known species of this genus may be contrasted as follows:—

P. boissoneauti.—Tufts on side of neck pure white. Primaries and wing-coverts ferrugineous-umber. Jugulum faintly squamated with dusky. *Hab.*—New Granada and Ecuador.

P. lawrencii.—Tufts on side of neck creamy-buff. Primaries and wing-coverts brownish-black. Jugulum heavily striped with dusky. *Hab.*—Costa Rica.

The proportions of both species are exceedingly variable, as may be seen from the accompanying table of measurements, and are therefore of no use as specific characters.

The new form (*P. lawrencii*) was also obtained by Mr. A. Boucard at Navarro, Costa Rica, but that gentleman evidently overlooked the more important differences of plumage, though he alludes to the different color of the neck-tufts (Proc. Zool. Soc. Lond. 1878, p. 59), adding that he does not "for the present consider this difference sufficient to make another species of it".

Following is a more detailed description of *P. boissoneauti*, and tables of measurements of both species.

PSEUDOCOLAPTES BOISSONEAUTI, Lafr.

SP. CH.—Wing, 3.85–4.65; tail, 3.70–4.60; bill, from nostril, .42–.70; tarsus, .95–1.10; middle toe, .58–.70. Primaries and wing-coverts umber-brown, like the tertials; primary-coverts, dusky. Tufts on sides of neck pure white.

Adult: Pileum, auriculars, nape, and anterior portion of back brownish-black, streaked with pale fulvous, these streaks much broader, and very conspicuous, on the nape and back. Lower part of back, scapulars, and wings ferruginous-umber, the middle and greater coverts tipped with fulvous. Rump, upper tail-coverts, and tail deep brick-rufous, immaculate. A narrow superciliary streak of pale buff. Chin and throat white; neck-tufts pure silky white. Jugulum and breast buffy white, or very pale buff, faintly squamated with dusky, these markings heavier on sides of the breast. Rest of lower parts plain ochraceous-rufous, slightly paler on the middle of the abdomen. Bill black; lower half of mandible whitish.

Young: Pileum and auriculars plain brownish-black; superciliary stripe obsolete, except above the auriculars. Bill wholly black, but somewhat paler on gonys.

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P. boissoneauti.

.....	G. N. L..	Juv.	Bogota, Columbia	.....	4.15	4.20	0.42	.....	.....
.....	G. N. L..	♀ ad	.....do	.....	3.85	4.00	0.62	1.00	0.60
32800	U. S	♂ ad.	.....do.....	.....	3.90	3.70	0.70	0.95	.....
41076	U. S.....	— ad.	.....do.....	.....	4.50	4.55	0.48	0.95	0.58
.....	G. N. L..	♀ ad.	.....do.....	.....	4.50	4.40	0.48	1.00	0.60
.....	G. N. L..	♀ ad.	Quito, Ecuador.....	.....	4.10	4.00	0.60	1.00	.....
65272	U. S.....	— ad.	.....do.....	.....	4.65	4.30	0.52	1.10	0.62
65922	U. S.....	— ad.	.....do.....	.....	4.60	4.60	0.52	1.10	0.70
30945	U. S.....	— ad.	.....do.....	.....	4.40	4.50	0.50	1.10	0.65

P. lawrencii.

.....	U. S.....	♂	La Palma, Costa Rica	.....	4.15	4.15	0.50	1.00	0.70
.....	U. S.....	♂	.....do.....	.....	4.35	4.30	0.50	1.05	0.68

CARPODECTES NITIDUS.—A presumed young male of this excessively rare species, from Pacuare, Costa Rica, resembles the adult male, except that the terminal half (of the exposed portion) of the primaries is uniform dusky blackish, while the secondaries have a considerable part of their concealed portion dusky, the amount decreasing toward the inner ones, the tertials being entirely white; the primary-coverts have also their terminal half grayish dusky, while of the alulæ one feather on one side and two on the other are of the same color. The rump is also somewhat obscured by a grayish tinge. The pileum seems to be of a deeper shade of fine pearl-blue in this specimen than in an adult male in the National Museum from Nicaragua. Mr. Zeledon's specimen measures as follows:—Wing, 5.40; tail, 3.00; bill, from nostril, .45; tarsus, .95; middle toe, .85.

JUNCO VULCANI (Boucard).—This interesting new species was originally discovered by Mr. Zeledon in 1873, but the specimens which were then forwarded by him to the Smithsonian Institution, along with other species then new, but since, like the present one, rediscovered, never reached their destination. Specimens more recently collected by Mr. Zeledon are now before me, and upon examination I find that the species should be referred to the genus *Junco*, rather than to *Zonotrichia*. In fact, it agrees perfectly in its generic characters with the former, except that the back is streaked, while there is no white on the lateral tail-feathers. Like *J. cinereus* of the highlands of Mexico, and *J. alticola* of Guatemala, it has a bright yellow iris. Its alpine habitat—the summit of the Volcan de Irazu—still further favors this view of its affinities.

NOVEMBER 18, 1878.

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DESCRIPTIONS OF TWO GADOID FISHES, PHYCIS CHESTERI AND HALOPORPHYRUS VIOLA, FROM THE DEEP-SEA FAUNA OF THE NORTHWESTERN ATLANTIC.

By G. BROWN GOODE and TARLETON H. BEAN.

Three specimens of an undescribed species of *Phycis* were obtained by the U. S. Fish Commision during the past season. The larger one measured 0.242^{m} without caudal and two others respectively 0.143^{m} and 0.128^{m}. The former is the basis of the following diagnosis; the others being evidently immature and having the characteristics of the species, especially the length of the fin-filaments, less pronounced.

Phycis Chesteri, sp. nov.

Head contained in body (without caudal) 4⅓ times, height of body 5 times. Diameter of orbit in length of head 3⅓ times, maxillary twice. Barbel about one-third of diameter of orbit. Vent situated under 12th ray of second dorsal, and equidistant from tip of snout and end of second dorsal. Distance of dorsal fin from snout equal to twice the length of the mandible; the third ray of the first dorsal is extremely elongate, extending to a point (33d ray of second dorsal) two-thirds of the distance from snout to tip of caudal, its length more than twice that of the head, and more than four times as long as the rays immediately preceding and following it. Anal fin inserted immediately behind the vent, its distance from the root of the ventrals equal to that of the dorsal from the snout. As in the other species of the genus,* the ventral is composed of three rays, the first two much prolonged. The first is contained three times in the length of the body, the second is almost three times as long as the head, reaching to the 40th anal ray or ¾ of the distance from snout to tip of caudal; the third is shorter than the diameter of the orbit.

The pectoral is four times as long as the operculum. Scales large and thin, easily wrinkling with the folding of the thick loose skin, particularly in the median line of the sides of the body. Lateral line much broken on the posterior half of the body.

Scales 7, 90–91, 28.

Radial formula:—D. 9 or 10, 55 to 57. A. 56. C. 5, 18 to 21, 5. P. 17–18. V. 3.

*A critical study of the ventral fins of *Phycis* compels us to believe that the ventral fin is composed of three rays covered at the base with a thick skin in such manner as to obscure the third, short one, and to join the other two so that they appear like a single bifid ray. In young individuals of *Phycis chuss*, the third ray has its extremity protruding from the sheath, though in adults it becomes entirely enveloped, thus giving rise to the false definitions which have been given for this genus. An adult specimen of *Phycis furcatus*, Flem. (No. 17,371 of the National Museum collection), has the third ventral ray protruding.

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Table of Measurements.

Current number of specimen	21,840.		21,841.		21,843.	
	Trawl 174.		Trawl 194.		Trawl 194.	
Locality	42 miles E. ¼ S., Cape Ann, 140 fathoms, Aug. 27, 1878.		33 miles E. by S., Cape Ann. E. Pt., 110 fathoms, Aug. 31, 1878.			
	Millim.	100ths of length.	Millim.	100ths of length.	Millim.	100ths of length.
Extreme length (exclusive of caudal)	242	.....	143	.....	128	.....
Length to end of middle caudal rays	280	.....	166	.....	148	.....
Body:						
Greatest height	49	20	29	.....	23	.....
Greatest width	28	11½	.....	.....	.....	.....
Height at ventrals	39	16	23	.....	20	.....
Least height of tail	9	4	6	.....	5	.....
Head:						
Greatest length	56	23	33	.....	30	.....
Length of barbel	6	2½	4	.....	.....	.....
Greatest width	29	11½	16	.....	14	.....
Width of interorbital area	10	4½	7	.....	6	.....
Length of snout	15	6½	8	.....	6	.....
Length of operculum	13	5½	8	.....	7	.....
Length of maxillary	28	11½	17	.....	14	.....
Length of mandible	32	13	19	.....	17	.....
Distance from snout to centre of orbit	24	10	14	.....	12	.....
Diameter of orbit	17	7	10	.....	10	.....
Dorsal (first):						
Distance from snout	67	27½	38	.....	34	.....
Length of base	17	7	10	.....	10	.....
Length of first ray	15	6½	8	.....	8	.....
Length of second ray	28	11½	19	.....	15	.....
Length of third ray	117	48	50	.....	42	.....
Length of fourth ray	26	10½	15	.....	15	.....
Length of last ray	3	1½	15	.....	4	.....
Dorsal (second):						
Length of base	142	58	88	.....	79	.....
Length of first ray	15	6½	.....	.....	.....	.....
Length of longest ray (40th)	29	11½	17	.....	15	.....
Length of last ray	5	2½	4	.....	.....	.....
Anal:						
Distance from snout	121	50	64	.....	57	.....
Length of base	108	44	70	.....	64	.....
Length of first ray	9	4	.....	.....	.....	.....
Length of longest ray (37th)	20	8½	12	.....	.....	.....
Length of last ray	6	2½	.....	.....	.....	.....
Caudal:						
Length of middle rays	38	15½	23	.....	20	.....
Length of external rays	36	14½	20	.....	17	.....
Pectoral:						
Distance from snout	60	12½	34	.....	30	.....
Length	52	21½	32	.....	29	.....
Ventral:						
Distance from snout	54	22½	30	.....	28	.....
Length of first ray	96	39	47	.....	42	.....
Length of filaments	165	68	81	.....	70	.....
Length of second ray	15	6½	10	.....	8	.....
Branchiostegals	VII	.....	7	.....	7	.....
Dorsal	9–55	.....	9–57	.....	10–56	.....
Anal	47	.....	47	.....	47	.....
Caudal	5–18–5	.....	5–21–5	.....	5–21–5	.....
Pectoral	17	.....	17	.....	18	.....
Ventral	3	.....	3	.....	3	.....
Number of scales in lateral line	90	.....	ca. 91	.....	ca. 90	.....
Number of transverse rows above lateral line	7	.....	7	.....	7	.....
Number of transverse rows below lateral line	28	.....	28	.....	ca. 28	.....

Haloporphyrus viola, sp. nov.

Two specimens of an undescribed species of the genus *Haloporphyrus* of Günther were brought in, August 24, by Captain Joseph W. Collins, of the schooner "Marion" of Gloucester; they were taken on a halibut trawl-line on the outer edge of Le Have Bank, at a depth of four or five

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hundred fathoms. A species of this genus was described, under the name *Gadus lepidion*, by Risso,* from Mediterranean specimens. Günther, who referred the species to the new genus *Haloporphyrus* in 1862,† had a specimen from Madeira. Günther published preliminary notices of two species, *H. rostratus* and *H. australis*, in "The Annals and Magazine of Natural History", July, 1878, pp. 18 and 19, which were collected by the Challenger. The affinities of the four known species are indicated below.

Table of Affinities.

	Haloporphyrus lepidion.	*Haloporphyrus viola.*
Head	Contained 4 times in total length (without caudal).	Contained over 4 times in total length (without caudal).
Orbit	With diameter ⅓ length of head	With diameter ¼ length of head or slightly more.
Maxillary	Not extending to the vertical from posterior margin of orbit.	Extending to vertical from posterior margin of orbit.
Barbel	Longer than diameter of orbit	Scarcely equal to half diameter of orbit.
Vent	Inserted under 12th ray of second dorsal fin.	Inserted under 19th ray of second dorsal fin.
Anal	Inserted directly behind the vent, with slight depression in its middle, and terminating in advance of termination of dorsal.	Inserted behind the vent at a distance equal to length of 2d anal ray, with a considerable depression in its middle, and terminating in a line with termination of dorsal.
Pectoral	More than half as long as head	More than four-fifths as long as head.
Ventral	Inner ray as long as head, and reaching to the vent.	Inner ray shorter than head (⅓) and reaching half-way to the vent.
Radial formula	D. 4, 54; A. 49; V. 6	D. 4, 53; A. 40; V. 6.
Scales	In lateral line, 210 Above lateral line, 15	In lateral line, 115. Above lateral line, 11.
Habitat	Madeira	Le Have, 400–500 fathoms.

	Haloporphyrus rostratus.	*Haloporphyrus australis.*
Head		One-fourth of total without caudal; depth of body two-fifths.
Anal	Imperfectly divided, approaching, in that respect, the genus *Mora*. Günther makes this the type of a distinct subgenus, *Antimora*.	
Radial formula	B. VII; D. 4, 51–56; A. 38–39; V. 6	D. 9, 50–52; A. 53; V. 8.
Habitat	Deep sea, midway between Cape of Good Hope and Kerguelen's Land; east of the mouth of Rio Plata, 600 and 1,375 fathoms.	Puerto Bueno, Magellan Straits, 55–70 fathoms.

Description.—Extreme length of type-specimen (No. 21,837, U. S. N. M.) without caudal 0.435^{m} (17⅛ inches), with caudal 0.480^{m}: length of collateral type (No. 21,838) without caudal, 0.545^{m}; with caudal, 0.603^{m}. The shape of the body resembles that of the species of the genus *Phycis*, though somewhat shorter, higher, and more compressed, its greatest height contained about five times in its length (without caudal), its height at the ventrals slightly exceeding one-eighth of its total length,

* Ichthyologie de Nice, 1810, p. 118, pl. xi, fig. 40.

† Catalogue of the Acanthopterygii, Pharyngognathi, and Anacanthini in the Collections of the British Museum, 1862, p. 358.

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its height at the middle of the caudal peduncle one twenty-ninth of the same.

Scales arranged in about 115 vertical rows and about 38 horizontal ones, about 11 being between the origin of the dorsal and the lateral line and about 27 below the lateral line. Lateral line slightly curved upward in the anterior fourth of its length.

Length of head contained more than four and one-quarter times in that of the body; its width half its length and less than double that of interorbital area.

The barbel is short, its length being scarcely equal to half the diameter of the orbit and about one-tenth the length of the head. The width of interorbital area is about equal to the longitudinal diameter of the orbit, in the larger specimen slightly greater. The diameter of the orbit is equal to or slightly greater than one-fourth the length of the head. The length of the snout is equal to that of the operculum and less than width of interorbital area.

The maxillary extends to vertical from posterior margin of the orbit, its length about equal to the greatest width of the head. Mandible equals one-eighth of total length without caudal.

Snout equal to operculum in length, obtusely pointed, much depressed, its lateral outline subconical, a conspicuous keel extending backward along the lower line of the orbit to its posterior margin. The head and mouth closely resemble those of some species of *Macrurus*, except that the keel is covered with small, smooth scales and is not overhanging. Lips scaleless.

Teeth in the jaws imperfectly serial, villiform, recurved; a small oblong patch of similar teeth on the head of the vomer; none on the palatines.

First dorsal fin inserted at a distance from the snout somewhat greater than twice the height of the body at the ventrals; its first ray is much prolonged, its length greater than that of the head, and nearly as long or longer (in the larger specimen) than the distance from the snout to the beginning of the dorsal. The second ray is contained less than four times, the third six times or less in the first, the fourth about ten times. The length of the base of second dorsal is somewhat more than twice the distance of its insertion from the snout; its greatest height, which is in the posterior fourth of its length (near the 40th ray), is contained about six or seven times in the length of its base.

The vent is situated at a point equidistant from snout and tip of caudal, under the 19th ray of second dorsal fin. The anal fin is inserted at a distance behind it equal to length of second anal ray. Its length of base is slightly more than half that of second dorsal. It has a considerable depression in its middle outline. The last rays of dorsal and anal are of equal length, and are directly opposite each other.

The caudal seems to be somewhat rounded. The length of the middle rays contained more than nine times in total length without caudal, and more than ten times in length including caudal.

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Pectorals narrow, inserted under the base of first dorsal. In the smaller specimen they reach to the perpendicular from the ninth ray of the second dorsal, in length equalling the greatest height of the body.

Ventrals inserted at a distance from tip of snout equal to half the length of anal base; the second ray nearly twice as long as the first, and in the smaller specimen, in which it is unmutilated, nearly as long as the head.

Radial formula:—D. 4, 53; A. 40; C. 5, 20 or 21, 5; P. 1, 19; V. 6.

Color.—Deep violet or blue.

Table of Measurements.

Current number of specimen	21,837.		21,838.	
Locality	Edge of Le Have Bank.			
	Millim.	100ths of length.	Millim.	100ths of length.
Extreme length (without caudal)	435	.....	545	.....
Length to end of middle caudal rays	480	.....	603	.....
Body:				
Greatest height	ca. 83	19	.....	.....
Greatest width	44	10	.....	.....
Height at ventrals	55	12⅔	.....	.....
Least height of tail	15	3½	.....	.....
Length of caudal peduncle	19	4⅓	.....	.....
Head:				
Greatest length	100	23	125	23
Length of barbel	10	2⅓	13	2⅓
Greatest width	50	11½	63	11⅔
Width of interorbital area	27	6¼	35	6½
Length of snout	25	6	27	5
Length of operculum	25	6	27	5
Length of maxillary	49	11	62	11½
Length of mandible	55	12⅔	74	13
Distance from snout to centre of orbit	44	10	50	9⅓
Diameter of orbit (longitudinal)	27	6¼	32	6
Dorsal (first):				
Distance from snout	113	26	136	25
Length of base	16	4	25	4⅔
Length of first ray	107	24⅔	140	25½
Length of second ray	25	6	33	6
Length of third ray	19	4⅓	22	4⅓
Length of fourth ray	10	2⅓	14	2⅔
Dorsal (second):				
Length of base	273	62½	340	62
Distance from snout	133	30⅔	160	29
Length of first ray	27	6¼	33	6
Length of longest ray (41st)	32	7⅓	53	9⅔
Length of last ray	8	2	.....	.....
Anal:				
Distance from snout	266	61	.....	.....
Length of base	142	32⅔	.....	.....
Length of first ray	10	2⅓	.....	.....
Length of longest ray (26th)	35	8	.....	.....
Length of last ray	8	2	.....	.....
Caudal:				
Length of middle rays	ca. 45	10⅓	ca. 58	10⅓
Pectoral:				
Distance from snout	104	23⅔	137	25
Length	83	19	105	19
Ventral:				
Distance from snout	71	16	.....	.....
Length of first ray	48	11	52	10
Length of second ray	92	21	.....	.....
Branchiostegals	.....	VII	.....	VII
Dorsal	.....	4, 53	.....	4, +
Anal	.....	40	.....	40
Caudal	.....	5, 20 or 21, 5	.....	.....
Pectoral	.....	1, 19	.....	1, 19
Ventral	.....	6	.....	.....
Number of scales in lateral line	.....	ca. 115	.....	.....
Number of transverse rows above lateral line	.....	ca. 11	.....	.....
Number of transverse rows below lateral line	.....	ca. 27	.....	.....

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DESCRIPTION OF ARGENTINA SYRTENSIUM, A NEW DEEP-SEA FISH FROM SABLE ISLAND BANK.

By G. BROWN GOODE and TARLETON H. BEAN.

The United States Fish Commission has lately received from Capt. Joseph W. Collins, of the schooner Marion, of Gloucester, Mass., and from Mr. R. L. Newcomb, of Salem, who accompanied him on this voyage as a collector, an apparently undescribed species of *Argentina*. A single specimen was taken September 4, 1878, from the stomach of a hake (*Phycis tenuis?*) hooked on a halibut trawl-line, set in 200 fathoms of water, on Sable Island Bank, off the coast of Nova Scotia. This fish (No. 21,624) is about 17 inches long and in a dilapidated condition, having been partially digested by its first captor. The tips of the fins, especially, are much frayed out. The measurements, however, are believed to be very nearly exact.

Argentina syrtensium, sp. nov.

Description.—Body compressed, resembling in form that of *Silus Ascanii* Reinhardt (= *Argentina silus* (Asc.) Nillson); its height contained about $5\frac{1}{8}$ times in its length without caudal, and slightly greater than twice the diameter of the orbit; its greatest width one-tenth of total length; its height at ventrals contained about $5\frac{3}{4}$ times in the same and equal to thrice least height of body at the caudal peduncle.

Length of head slightly less than twice its greatest height, and slightly more than one-fourth of the length of the body; its greatest width is twice that of the interorbital area. The length of the snout equals that of the operculum, is slightly greater than that of the maxillary, and is contained not quite $3\frac{1}{2}$ times in the length of the head.

The first dorsal fin is inserted midway between snout-tip and adipose dorsal fin; its basal length equal to the height of its first ray, and slightly more than half that of the longest ray; it is also equal to the orbital diameter and the length of the mandible; the last dorsal ray is slightly longer than the height of the caudal peduncle.

The adipose dorsal fin is inserted in the perpendicular from the seventh anal ray; its basal length, which is two-thirds of its height, being about equal to one-tenth of the length of the head.

The anal fin is inserted in the perpendicular from the 44th or 45th scale of the lateral line, its length of base slightly greater than length of the mandible, its first ray one-third as long as its third ray, its last ray equalling in height the adipose dorsal.

The caudal is deeply forked, its external ray $2\frac{1}{2}$ times as long as its median rays.

The pectoral is inserted close to the branchial opening; its length is equal to three-fifths of the distance of its insertion from the snout-tip,

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extending posteriorly to about the twelfth scale of the lateral line and more than half-way to the origin of the ventrals.

The ventral is inserted midway between the snout-tip and the insertion of the caudal fin, and in the perpendicular from the posterior dorsal ray; its length equals half the distance from the origin of the pectoral to that of the ventral.

Radial formula.—B. VI; D. 12; A. 13; C. 13, 18, 12; P. 18; V. II, 12.

Scales.—$3\frac{1}{2}$, 60, 4. The scales are cycloid, with the posterior edge emarginate, the exposed surface covered with minute asperities; as in some, and perhaps all other members of this group, single rows of scales saddle the dorsal and the abdominal ridges of the body. The scales are very large: one from the abdominal row, directly behind the ventrals, measuring $6\frac{1}{2} \times 4\frac{1}{2}$; one from the lateral line, $5\frac{1}{2} \times 3\frac{1}{4}$, the unit of measurement being the hundredth of body-length. One of the scales of the lateral line, detached, is broad enough to cover the exposed surfaces of five others in the same line.

Color.—The color is considerably obliterated, but appears to have been similar to that of the common smelt (*Osmerus mordax*), with perhaps more of a metallic lustre.

The species, according to Mr. Newcomb, has a cucumber-like smell, resembling that of the smelt.

Table of Measurements.

Current number of specimen	21,624.	
Locality	Sable Island Bank. Stomach of Hake.	
	Millim.	100ths.
Extreme length without caudal	382	
Length to end of middle caudal rays	408	
Body:		
Greatest height		19
Greatest width		10
Height at ventrals		17.5
Least height of tail		5.73
Length of caudal peduncle		
Head:		
Greatest length		26
Greatest height		
Greatest width		10
Width of interorbital area		5
Length of snout		7
Length of operculum		7
Length of maxillary		6¼
Length of mandible		9
Diameter of orbit		9
Dorsal (first):		
Distance from snout		43
Length of base		9
Length of longest ray		17
Length of first ray		9
Length of second ray		15½
Length of last ray		6.3
Dorsal (soft):		
Length of base		2¼
Distance from snout		85
Anal:		
Distance from snout		83
Length of base		9½
Length of first ray		3
Length of longest ray		9
Length of last ray		2.66

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Table of Measurements—Continued.

	Millim.	100ths.
Caudal:		
Length of middle rays		7
Length of external rays		17
Pectoral		
Distance from snout		25
Length		ca. 15½
Ventral:		
Distance from snout		50
Length		ca. 12
Branchiostegals	VI	
Dorsal	12	
Anal	13	
Caudal	XIII, 18, XII	
Pectoral	18	
Ventral	II, 12	
Number of scales in lateral line	ca. 60	
Number of transverse rows above lateral line	ca. 3½	
Number of transverse rows below lateral line	ca. 4	

WASHINGTON, *November* 23, 1878.

ON THE OCCURRENCE OF THE OCEANIC BONITO, ORCYNUS PELAMYS, (LINNÉ) POEY, IN VINEYARD SOUND, MASSACHUSETTS.

By VINAL N. EDWARDS.

Mr. P. Stewart has caught between 80 and 100 of them in his pound* in about three weeks. He caught 52 one morning. In Luce's pound* they have caught between 60 and 70. They catch them with a northerly wind; none with the wind off shore. They will not live long in the pound, but will run themselves to death, and their brilliant blue color all fades out as soon as they are dead.

WOOD'S HOLL, MASS., *October* 1, 1878.

NOTES ON THE WESTERN GIZZARD SHAD, DOROSOMA CEPEDIANUM HETERURUM, (RAF.) JORDAN.

By SAMUEL WILMOT.

SIR: I send you by post a small fish taken by one of our fishermen at Sarnia on Lake Huron. It was sent to me by one of our officers, with a request that I should let him know what sort of fish it was. It seems they think it to be a young shad. Fish very similar in appearance to this one have been known in Lake Ontario and other of our waters for many years; I recollect them forty years ago. They were not taken numerously in those days, a few being captured at times in seines, and sometimes in gill-nets, which were set out in very deep waters in the lake for the purpose of taking salmon trout: those taken in the gill-nets would be sometimes a pound in weight; the great run of them, however,

*These pounds are in Menemsha Bight, Martha's Vineyard.

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never exceeded three to six inches in length. Strange to say, however, that during the past four years these little fish have become so numerous throughout the length of Lake Ontario that millions can be taken in one haul of a seine almost anywhere along the shore of Lake Ontario during the month of June. The whole shore for a long distance out, during this time, becomes so dense with these little fish that people dip them out with their hats,—rather a novel method, but it is a fact, and given for illustration of their immense numbers: vast quantities of them die along the shore. In a few days, sometimes a fortnight, they all disappear, and we see nothing of them again till the following year, excepting an odd one that may be taken at times. They invariably run from two to six inches, seldom larger. They are not prized for food, being seldom eaten, and are not marketable. They have been called here the "Moon Eye", as they resemble the fish spoken of by me as having been taken in the deep waters, which have always been known by that name. Again, in 1873, 1874, 1875, 1876, and this year, these little fish have been alike abounding in myriads all along the north shore of Ontario. Since that time, the trout and other predaceous fishes have become very scarce in the lake, and these "Moon Eyes" have consequently wonderfully increased in numbers, to such an extent as to spread themselves in the immense number spoken of all along the shore of the lake.

The specimen sent may not be one of these "Moon Eyes", but the resemblance is very great.*

Professor BAIRD,
Commissioner of Fisheries, &c., Washington, D. C.

NEWCASTLE, *November* 23, 1877.

THE OCCURRENCE OF THE CANADA PORCUPINE IN WEST VIRGINIA.

By G. BROWN GOODE.

The National Museum has obtained from Mr. H. D. Renninger, of Washington, a living specimen of the Canada porcupine (*Erethizon dorsatus* (Linn.) F. Cuv.—var *dorsatus*), captured by him November 13, 1878, near Cranberry Summit, Preston County, West Virginia. This locality is in or near lat. 39½ N., and this is believed to be the most southern occurrence of the species. The inhabitants of Cranberry have never before known of the occurrence of porcupines in that region.

DeKay stated† that the species ranged south to the northern parts of Virginia and Kentucky. Mr. Allen believes that his statement was founded on a remark of Catesby. Audubon and Bachman write:‡ "It

*The fish received from Mr. Wilmot is the Western Gizzard Shad, *Dorosoma cepedianum heterurum*, (Raf.) Jordan.

†Nat. Hist. N. Y. 1842, 1, p. 79.

‡Quadrupeds of N. America, 1, 1846, p. 286.

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does not exist in the southern parts of New York or Pennsylvania. DeKay states that it is found in the northern parts of Virginia and Kentucky. We, however, sought for it without success in the mountains of Virginia, and could never hear of its existence in Kentucky."

Professor Baird states* that the species is found as far south as Northern Pennsylvania in some localities, in which State it is not rare even now.

Mr. J. A. Allen, the most recent writer on the porcupines, remarks,† that Professor Shaler had failed to hear of the species in Kentucky and Virginia. He was informed by Dr. J. M. Wheaton that a few porcupines still survive in Clark, Champaign, and Ross Counties, Ohio, and that it was common ten years since in Putnam County; and by Mr. E. W. Nelson that the species was formerly rather common, though never abundant, in all of the wooded region north of the Ohio River, but that it is not now found (west of Ohio) south of the forests of Northern Wisconsin and Northern Michigan.

DECEMBER 12, 1878.

CATALOGUE OF THE BIRDS OF GRENADA, FROM A COLLECTION MADE BY MR. FRED. A. OBER FOR THE SMITHSONIAN INSTITUTION, INCLUDING OTHERS SEEN BY HIM, BUT NOT OBTAINED.

By GEORGE N. LAWRENCE.

In my Catalogue of the Birds of St. Vincent, I stated that Mr. Ober expected to leave that island for Grenada on the 29th of February. He must have left about that time, as some of his notes from Grenada are dated early in March. His collection from there was received at the Smithsonian Institution on the 22d of May, and sent to me a few days after. It consists of but 66 specimens.

In the following communication from Mr. Ober, he gives the geographical position of the island, with other matters of interest.

Under most of the species found there, are his notes of their habits, etc.

His communications are marked with inverted commas.

"Grenada, the southernmost of the volcanic islands, lies just north of the 12th degree of latitude north of the equator, that parallel just touching its southern point.

"It is about 18½ miles in length, from N. N. E. to S. S. W., and 7½ miles in breadth.

"From Kingston, the principal town in St. Vincent, to St. Georges, that of Grenada, the distance is 75 miles; from the southern end of St. Vincent to the northern point of Grenada the distance is 60 miles; the intervening space being occupied by the Grenadines.

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*Mammals of North America, 1859, p. 568.

†Monographs of North American Rodentia, by Elliott Coues and Joel Asaph Allen, 1877, p. 393.

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"It is very rugged, the interior of the island being one mountain chain with its offsets, and there is a less area of fertile land than in St. Vincent. The valleys that make up from the coast, and the levels lying between the hills and some portions of the coast, however, are very fertile. It is not a promising island for ornithological research, though at first glance it would seem to be able to afford rich reward.

"The mountains in the interior are volcanic; there are several extinct craters, in the largest of which is an attractive lake, 2,000 feet above the sea; it is 2½ miles in circumference and has an average depth of 14 feet. St. Georges, the only port of any size, lies on the southwestern coast, and is highly picturesque in location, but not so attractive in the eyes of an ornithologist as it might be; the surrounding hills are rocky, and those not rocky are cultivated, so that they are inhabited by very few birds.

"Across the bay from the town, on the borders of the 'lagoon,' which is fringed with mangroves, may be found a few water birds, and in the sloping pastures at the foot of the high hills a small variety of the smaller birds.

"The southern point, Point Saline, is an excellent place for the migratory birds: plover, duck, etc., which visit this island in quantities, and some points on the eastern coast are equally good.

"I spent two weeks in and near St. Georges and St. Davids, and two weeks in the mountains and on the eastern coast.

"As this island is so near the South American continent, being but 100 miles from Trinidad and 70 miles from Tobago, I expected to find some forms of animal life different from those in the northern islands among the resident species. But with the exception of now and then a straggler being blown to these shores, there is no species (if we may except two) that would indicate proximity to a great tropical country.

"Some species common in the northern islands, from Guadeloupe to St. Vincent, have disappeared, and in one or two cases their places taken by others; notably is this the case in the instance of *Eulampis jugularis* being replaced by *Glaucis hirsutus*.

"There is no parrot as in St. Vincent, and the two species of thrush, locally known as the 'grives'—*Margarops densirostris* and *M. montanus*—do not exist here. Other minor differences occur, which will be apparent upon examining the catalogue.

"The most interesting fact regarding the higher order of animal life, is the existence here of an armadillo, once common in all the Lesser Antilles, but now extinct in all the northern islands.

"A species of monkey also lives in the deep forests of the mountains; a skin of one has been sent to the Museum.

"The most interesting portion is undoubtedly that of the mountains immediately adjacent to the mountain lake; but, if it were possible for a naturalist to spend an entire year in the island, doubtless the more southern portion would reward him better in species: for the season of

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migration would probably bring many stragglers from the continent, that do not make a longer stay than a few days.

"It is only a matter of regret with me that I could not give the requisite time to this island during the 'winter months'. I am satisfied, however, that the few resident species are now fully known.

"FREDERICK A. OBER.

"My thanks are due to Wm. Sharpe, Esq., Wm. Simmons, Esq., Dr. Wells, Canon Bond of St. Andrews and John Grant Wells, Esq., for courtesies shown me."

Fam. TURDIDÆ.

1. Turdus nigrirostris Lawr.

"Thrush ('Grive').

"Length, ♂, 9 in.; alar extent, 15¼; wing, 5.

"Length, ♀, 9 in.; alar extent, 14½; wing, 4¾.

"In the deep woods one may be startled by a low note of alarm from this bird, like the single cluck of the Mocking-bird of the Southern States. Searching carefully, you may discover the author of it sitting upon a low tree, with head protruded, eagerly examining the surroundings for the cause of the noise your coming makes. Discovering you, it hastily makes off, with a parting cluck. Its song is often heard in the high woods, strange notes, 'fee-ow, fee-oo,' etc., often repeated. Another cry it has when alighting and unexpectedly discovering your presence, similar to the cry of the Robin as heard at evening time in spring—a harsh cry mingled with softer notes. I have only found it in the high forests. It must be well along in the nesting period, judging from the condition of those dissected."

I was much pleased to find four specimens of this species in the collection, as but one was obtained in St. Vincent, and that had the plumage somewhat soiled. These are in good condition and more mature: they have the color of the throat as originally described, *i. e.*, the feathers of a dull white, with shaft-stripes of brown; there are no rufous terminations to the wing-coverts, as in the St. Vincent specimen; and the irregular rufous-brown markings on the upper part of the breast, as seen in that, are only just perceptible in two of the specimens: they have the breast and flanks of a darker shade of brown: the bills of these are not so dark throughout as in the type—shading into brown on their terminal halves: this difference of color is doubtless attributable to age.

2. Turdus carribæus, Lawr. Ann. N. Y. Acad. of Sci. vol. 1, p. 160.

"Thrush.

"Length, 9¼ in.; alar extent, 15¼; wing, 5.

"Iris wine-red; naked skin around the eye, ⅜ inch wide, yellow; beak olive-green, tipped with yellow. I am positive that I heard this bird in St. Vincent, but only once, and did not obtain, or even fairly see it. Its cry is peculiar, and once heard could not be mistaken. It resem-

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bles the cry of the Whippoorwill in the morning, just as it utters the 'poor-will', and just preceding the final cluck. It was not a stretch of the imagination, either, to fancy a cry like '*how de dew*' (as uttered by the country gentleman when saluting an acquaintance), with the stress upon *dew*. It has also, when alarmed or when threading a strange thicket, the soft call-note of the Thrushes, similar to that of the *grive* or Mountain Thrush. It inhabits the thick growth of old pastures, and seems to prefer the dark recesses beneath the overhanging trees and bushes of the hillsides on the borders of the opens."

3. Mimus gilvus, Vieill.

"Mocking-bird.

"Length, ♂, 9½ in.; alar extent, 14; wing, 4½.

"Rather plentifully distributed on the hills sloping seaward; found also well up the sides of the mountains, but not in the high woods, nor far away from cleared land."

Fam. TROGLODYTIDÆ.

4. Thryothorus grenadensis, Lawr. Ann. N. Y. Acad. of Sci. v. 1, p. 161.

"Wren; 'God-bird.'

"Length, ♂, 5 in.; alar extent, 7; wing, 2¼.

"A sprightly bird, found in houses in the country, in the forests and in the towns.

"Its song is a pleasing warble, and this, with its bright ways, make it a welcome visitor. The blacks will eat nearly every bird but this and the *corbeau;* but this, they say, 'make you dead,' for it is God's bird.

"Found an old nest in the house at Grand Etang, but the young had gone ('it make child, but he go'), I was told. They were hatched in February. A nest under the veranda now has four young, recently hatched. Going down to examine them one day, I found one of them had about four inches of a 'God's horse' ('Walking-stick') (Phasmida) protruding from its mouth. The nest is of dried grass, lined with feathers. Had it not been that these little beggars excited feelings of compassion in my breast, I would have added the old ones to my collection, well knowing that they would be valuable acquisitions."

Fam. SYLVICOLIDÆ.

5. Setophaga ruticilla (Linn.).

"Only one seen. This was shot, but lost in the thick matting of the loose leaves that covered the ground. It was near the border of the mountain lake."

Fam. VIREONIDÆ.

6. Vireosylvia calidris var. **dominicana**, Lawr.

"*Vireosylvia.*

"Length, ♂, 6 in.; alar extent, 10; wing, 3⅜.

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"Length, ♀, 6 in.; alar extent, 9½; wing, 3⅛.

"Through the woods came a strangely familiar note, 'peow, peow'. The bird I could not discover at first, but thought I detected a note akin, and was confirmed that it was an old acquaintance of Dominica and St. Vincent, when I had it in my hand. Not very abundant."

Fam. HIRUNDINIDÆ.

7. Progne dominicensis (Gm.)?

"*Progne.*

"One species seen, but never within shot; to all appearance, it was identical with that obtained in St. Vincent."

Fam. CŒREBIDÆ.

8. Certhiola atrata, Lawr.

"*Certhiola.* Scarce. Resident.

"Length, ♂, 4¼ in.; alar extent, 7¾; wing, 2¾.

"This bird is not found in great numbers, as in some of the northern islands; indeed, I have seen it but twice—on the mangrove flats of Point Saline, where its habits were in great contrast to those of its northern congeners, being shy and retired, while in other islands bold and obtrusive."

Fam. TANAGRIDÆ.

9. Euphonia flavifrons (Sparm.).

"Louis d'Or. Rare. Resident.

"Length, 5 in.; alar extent, 8¼; wing, 2½.

"I have not seen this bird here alive. These specimens were shot by A. B. Wells, Esq., of St. Davids. It is not easily discovered, more from its rarity than from its shyness. Frequents the skirts of woods and nutmeg groves."

10. Calliste versicolor, Lawr.

"Sour-sop Bird. Abundant. Resident.

"Length, ♂, 6⅛ in.; alar extent, 9¼; wing, 3.

"Length, ♀, 6 in.; alar extent, 9¼; wing, 3⅛.

"Though in St. Vincent I saw the bird only in small numbers and solely in the mountains, here it is everywhere. The same chattering cry, noisy in feeding, calling one to another, gregarious, is greedy in its search for food, a flock of from 8–12 may be seen swarming over a small tree or bush. It is very partial to the seed of the Sour-sop, which gives it its local appellation. It is now nesting."

Fam. FRINGILLIDÆ.

11. Loxigilla noctis (Linn.).

"Length, ♂, 5¼ in.; alar extent, 8½; wing, 2¾.

"Length, ♀, 5⅛ in.; alar extent, 8¾; wing, 2¾.

"One of the most common birds, second only to the small 'grass bird' (*Phonipara bicolor*)."

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12. Phonipara bicolor (Linn.).

"*Phonipara bicolor.* 'Si Si Zerbe.'

"Everywhere abundant, so common in fact that, thinking I could obtain it at any time, I devoted my attention to other rarer birds, and finally left without a specimen."

Fam. ICTERIDÆ.

13. Quiscalus luminosus, Lawr. Ann. N. Y. Acad. of Sci. v. 1, p. 162.

"Blackbird. Resident.

"Length, ♂, 10¼ in.; alar extent, 15¼; wing, 5.

"Length, ♀, 9¾ in.; alar extent, 14; wing, 4¾.

"This bird first occurs in the Grenadines. It has seldom been seen in St. Vincent, although abundant on the small islands of Balliceaux and Bequia. The latter is not ten miles distant. It is there called the 'Bequia Sweet', from its notes: 'Bequia sweet, sweet.'

"It is social, gregarious, seeming to delight in company, spending a great part of the day in sportive play. The first I saw were in Balliceaux, one of the northernmost of the Grenadines. I was struck with the similarity of a habit of theirs to one of the Boat-tailed Grakle of Florida and the South, as I had observed it on the banks of the St. John's River. A party of them had come down to drink at a small pool in one of the pastures. After drinking, each male would lift its beak perpendicularly, spread out its wings and one leg, and give utterance to a joyous cry, as though giving thanks for the enjoyment afforded by the drink. Then the whole crew would join in a general outburst, both females and males. Then they would adjourn to a near fence rail, and keep up a social conversation, stretching their legs and wings and showing their glossy feathers to the sun. The air would then resound with the cries, said by the islanders to be, 'Bequia sweet, sweet, sweet.' That was in February. Though I then expected to get them to send home with the St. Vincent collection, I was disappointed, as our boat was smashed on a neighboring rock next day, and we were picked up and carried to St. Vincent without an opportunity for getting the birds.

"In Grenada I found them in abundance again, flying in flocks and inhabiting exclusively the lowlands, the swamps and borders of the lagoons. It is easily attracted by unusual sounds, as I once proved while hunting Yellow-crowned Night Herons in a swamp on the eastern coast, by calling around me not less than forty, who filled the bushes and trees around and above me, staying a long while.

"Think it is exclusively confined to Grenada and the Grenadines."

Fam TYRANNIDÆ.

14. Elainea martinica (Linn.).

"Flycatcher. Resident. Rather numerous.

"Length, ♂, 7⅜ in.; alar extent, 11; wing, 3⅝.

"Length, ♀, 6⅝ in.; alar extent, 10½; wing, 3½.

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15. Myiarchus oberi, Lawr.

"Flycatcher. Not abundant.

"Length, ♂, 9 in.; alar extent, 13; wing, $4\frac{1}{8}$.

"Length, ♀, $8\frac{3}{4}$; alar extent, $12\frac{1}{2}$; wing, 4.

16. Tyrannus rostratus, Scl.

"*T. rostratus*. Resident. Abundantly distributed.

"Length, ♂, 10 in.; alar extent, $15\frac{3}{4}$; wing, 5.

"Length, ♀, 9 in.; alar extent, $14\frac{3}{4}$; wing, $4\frac{3}{4}$.

"Occurring at all altitudes, but preferring the lowlands, open fields, and hills. Delights in a shrub with bare protruding prongs, or an open-foliaged tree like the trumpet tree and bread fruit. Its cry is a shrill 'piperee, piperee'; hence its name. Especially partial to the tall cabbage palm (palmistes), making its home in the fronds, and darting thence upon any passing insect.

"More abundant in Antigua than elsewhere. Its large flat bill, the concealed flushes of yellow beneath the wings, and the beautiful silken feathers of saffron and crimson concealed in the crown, make it an interesting specimen in the hand, though it is a very ordinary looking bird as seen in activity."

17. Tyrannus melancholicus, Vieill.

"*Tyrannus* ———. The first seen.

"Length, ♂, 9 in.; alar extent, $14\frac{1}{2}$; wing, $4\frac{3}{4}$.

"The first bird of this species shot seemed fatigued from a long flight, and I thought it must have come from another island, Tobago or Trinidad. It has never been seen by those who observe the birds of the island. I still think it a straggler from Tobago."

Two specimens are in the collection. This and the following species (*Glaucis hirsutus*) are the only South American forms that were procured, showing how strictly this and the islands north of it are defined as a distinct zoological province. In the islands to the south, viz, Tobago and Trinidad, the birds assimilate to those of the South American continent.

Fam. TROCHILIDÆ.

18. Glaucis hirsutus (Gm.).

"Brown Hummer. (New to me.)

"Length, ♂, $5\frac{1}{2}$ in.; alar extent, $6\frac{3}{4}$; wing, $2\frac{1}{2}$.

"Length, ♀, $5\frac{1}{4}$ in.; alar extent, $6\frac{1}{2}$; wing, $2\frac{1}{2}$.

"This species entirely replaces the Garnet-throat (*Eulampis jugularis*), of which latter I have not seen a single specimen. This one is confined to the same haunts, viz, the cool depths of the high woods, and is never seen in the valleys or below the last ring of high cliffs and forest-trees. So closely does the plumage of this hummer assimilate with the color of the fallen leaves, dry as well as green, that I lost my first specimen and found the others only by long search."

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19. Eulampis holosericeus (Linn.).

"Green-throat. 'Colibri.' Scarce.

"Length, ♀, 5 in.; alar extent, 6⅛; wing, 2½.

"Feeding from the crimson flowers of a huge cactus, I saw this humming-bird this morning, in a hedge row bordering the road to St. Davids. It does not occur in the abundance that I find of the small crested hummer, and I have not seen it in the mountains."

20. Orthorynchus cristatus (Linn.).

"*O. exilis?* March 16th.

"Length, ♂, 3⅝ in.; alar extent, 5; wing, 2.

"The crest seems brighter and deeper than in those of Dominica and St. Vincent. It is distributed profusely throughout high woods, hills, upper valleys, and sea-coast; everywhere I see its glancing crest, hear the whirring of its wings. Just a year ago I found a nest in Dominica; here in the mountains they have not yet built their nests, though it is possible they may have commenced in the lowlands. They are in the thickets between the Grand Etang and the deep woods, visiting the different flowers so frequently that it seems to me they must be exhausted of sweets and insects."

Fam. CYPSELIDÆ.

21. Chætura sp.?

"I was unfortunate with this bird, never getting one within range. It is of the same shape, size, and color of the species obtained in Dominica. Only one species seen."

Fam. ALCEDINIDÆ.

22. Ceryle alcyon (Linn.).

"Length, ♂, 12½ in.; alar extent, 20½; wing, 6¼.

"Though nearly a year has passed since I first saw the Kingfisher of these islands (in Dominica), this is the first island in which I have been able to shoot one. It is very shy, and somehow I have always just missed it, in Dominica as well as St. Vincent, in neither of which islands is it plentiful; and it was only by the most artful bushwhacking that I at last got this one. Not abundant; resident."

Fam. CUCULIDÆ.

23. Coccyzus minor (Gm.).

"'Cuckoo manioc.' Abundant; resident.

"Length, ♂, 12½ in.; alar extent, 16; wing, 5½.

"The harsh cry, resembling somewhat that of the Yellow-billed Cuckoo, may be heard almost any day, proceeding from the low growth of some overgrown pasture or hillside.

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"Of unsuspicious demeanor, this bird will allow a near approach; if it flies, it is but for a short distance, to a low tree or thick shrub, where, if unmolested, it hops about with apparently aimless intent, though keeping a good lookout for its food, butterflies, moths, etc.

"Very common on the hillside beyond the Carenage."

24. Crotophaga ani, Linn.

"'Corbeau.' Abundant; resident.

"Length, ♂, 15 in.; alar extent, 17; wing, 6.

"Length, ♀, 14 in.; alar extent, 16½; wing, 5½.

"Called the 'Tick-bird' in St. Vincent; here the 'Corbeau', French for Raven. Said to have been blown over from Trinidad in a gale some years ago. It has increased wonderfully; not held in favorable repute; eats ticks, bugs, etc., but also eats corn and guinea-grass grain. The same stupid unsuspicious bird everywhere; breeds abundantly; gregarious. Where one goes and persistently calls, the rest of the flock, from 6 to 12, will surely follow. In a tree or bush they cluster close together; have a squeaking cry.

"They build a large loose nest, and lay in it eggs of a greenish color. A curious habit of theirs is to build a second nest upon one already filled with eggs. The only nest I have examined had not a full complement of eggs, and I cannot tell just what number they lay."

Fam. STRIGIDÆ.

25. Strix flammea var. **nigrescens,** Lawr.

"Owl; 'Jumbie Bird.' Rare.

"Length, ♂, 12 in.; alar extent, 30½; wing, 10.

"In different parts of the island are the towers of ancient wind-mills, which, in various stages of ruin and dilapidation, are going to decay. Being made of stone, and generally covered with ivy and running vines, without roof and full of holes, they offer excellent places of abode for the owls, and there is rarely a ruin without its occupant to frighten the negroes to the verge of insanity with its nocturnal hootings. From a superstitious dread of the 'Jumbie bird,' and from the fact that these old mills are well hung with the nests of 'Jack Spaniard'—a wasp, it is difficult to get a negro to climb into a tower to dislodge the owl.

"I am indebted for this one to Mr. Goddard, the manager of the Estate of Clarke's Court."

Fam. FALCONIDÆ.

26. Pandion haliætus (Linn.).

"An infrequent winter visitor on the east or Atlantic coast."

27. Buteo pennsylvanicus (Wils.).

"Length, ♀, 15½ in.; alar extent, 35; wing, 11.

"At this time (March 25) it is engaged in incubation. Not abundant; resident."

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28. Tinnunculus sparverius var. antillarum (Gm.).

"Very rare, and, so far as I can ascertain, confined to the eastern coast."

Fam. FREGATIDÆ.

29. Fregata aquila (Linn.).

"Breeds on the rocks north and northeast of Grenada, sparingly, but in increased numbers on some of the smaller Grenadines."

Fam. PHÆTHONIDÆ.

30. Phæthon æthereus, Linn.

"Cannot tell if it breeds in Grenada, but am of the opinion that it does. The specimens obtained in the northern Grenadines were included in the St. Vincent catalogue."

Fam. PELECANIDÆ.

31. Pelecanus fuscus (Linn.).

"Breeds on the rocks north of Grenada as well as throughout the Grenadines."

32. Sula fiber (Linn.).

"Inhabits the rocks off the northern coast. Most plentiful in the Grenadines."

Fam. ARDEIDÆ.

33. Ardea herodias, Linn.

"Extremely wild. I have seen it on different occasions, and in the different islands in different months, and pronounce it a straggling resident (if this term be allowable), that is, one or two may remain after the spring migrations and may breed, though I have heard of no authentic instance of its breeding."

34. Garzetta candidissima (Gm.).

"'Gaulin blanc.'

"Length, 23 in.; alar extent, 37; wing, 11.

"The abundance of this species is in striking contrast to its scarcity in St. Vincent. This may be attributed to the increased extent of low wet land, swamps, and lagoons.

"Only Antigua exceeds this island in the number of this species. As in Dominica and the other French-speaking islands, it is called the 'Gaulin blanc', and the heron in the blue plumage 'Gaulin noir' or 'bleu'. This is second in point of numbers of the herons, the 'Gaulin bleu' third, and the yellow-crowned fourth. The *B. virescens* is the most numerous of the whole. It breeds in the mangroves bordering the lagoon later in the season."

35. Florida cærulea (Linn.).

"It is not so common as the 'Gaulin blanc' and exceedingly shy."

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36. Butorides virescens (Linn.).

"Length, ♂, 18 in.; alar extent, 25; wing, 7.

"As my boat skirted the fringe of mangroves bordering the lagoon across the bay from St. Georges, it ousted numbers of this small species. They would fly a little ways, then dive into the deep foliage of the mangroves, where a very close inspection might detect it crawling among the spider-like roots, or threading its way through the mesh-work of aërial suckers seeking the mud. When started by the boat or gun, it gave utterance to its guttural cry, and as we moved along, the crackling and shutting of oyster shells accompanied us throughout."

37. Nyctiardea violacea (Linn.).

"A very shy and cautious bird, inhabiting the swamps near the sea-coast. I have at different times waited for hours for a shot at it in the deep mangroves, which it loves to frequent."

Fam. PLATALEIDÆ.

38. Platalea ajaja (Linn.).

"A very rare migrant, said to have been seen here."

Fam. COLUMBIDÆ.

39. Columba corensis, Gm.

"'Ramier.'

"Length, ♂, 16 in.; alar extent, 26½; wing, 9.

"I arrived at the Grand Etang, the lake in the mountains, about noon; within an hour, the only man living there started with me around the lake. After walking half an hour or so, we reached comparatively open woods, the trees thick and very high. We heard a pigeon coo, and after some time found him perched on the topmost branch of a tall 'figuer' tree, so high up that I at first mistook him for a 'grive'. At the report of my gun, he started wildly, flew a few yards upward, and then fell hurtling through the air, striking the ground with a thud. His crop was full of hard seeds, large as small bullets. They seem to be in these woods in good numbers."

"They are now (March 12th) mating. In November, December, and January, they visit the islands off the coast in great numbers, and are said even to extend their flight to Tobago, in which latter island they are not resident."

40. Zenaida martinicana, Bp.

"'Tourterelle.' Not plentiful.

"Length, ♂, 11½ in.; alar extent, 18; wing, 6¼.

"Length, ♀, 11 in.; alar extent, 17; wing, 6.

"In the mangroves bordering the bay of 'Clarke's Court' estate, near the southern end of the island, I found this dove. It was near noon of a very hot day, as the manager and another friend accompanied me into

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the deep shade of the 'mang' (as it was called), where the mud was half knee-deep, and stagnant pools crossed the surface. At that time the doves came in from the surrounding hills for the shade, and we did very well with them and the Ground Doves, as a dish of them at dinner amply testified. It is abundant outside of these mangrove swamps; it prefers the vicinage of the sea-coast."

41. Chamæpelia passerina (Linn.).

"'Ground Dove.' Abundant; resident.

"Length, ♂, 6½ in.; alar extent, 10; wing, 3¼.

"Length, ♀, 6½ in.; alar extent, 9; wing, 3½.

"Among all the dry hills about St. George's this little dove can be seen and heard. It frequents the pastures, the cane-fields, and, in the heat of the day, the mangroves for shade. Equally abundant on the east coast."

42. Geotrygon montana (Linn.).

"'Perdix.'

"I saw several of this species in the forest around the Grand Etang, and shot a fine female, which was unfortunately lost. By some strange mischance, I did not finally succeed in securing any specimens.

"They are exactly the same in size and coloring as those of Dominica and St. Vincent. I discovered two nests, each containing two eggs. They choose strange places for their nests, generally placing them upon some great parasite, attached to a small tree, 4–6 feet from the ground. Upon a slight covering of leaves they lay two coffee-colored eggs; the season for incubation is March and April."

Fam. RALLIDÆ.

43. Gallinula galeata (Licht.).

"Gallinule. Not common; resident.

"Length, ♀, 14½ in.; alar extent, 21; wing, 7."

44. Porzana?

45. Fulica?

"This was described as occurring in the volcanic lake near the north coast; also the preceding species."

Fam. CHARADRIIDÆ.

46. Charadrius virginicus, Borkh.

"At time of migration."

Fam. SCOLOPACIDÆ.

47. Tringoides macularius (Linn.).

"Sandpiper.

"Length, ♂, 7¼ in.; alar extent, 12½; wing, 4¼.

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"Shot on the east coast; frequents the coast and rivers in small numbers and seems to be a resident."

48. Numenius hudsonicus (Lath.)?

"At time of migration."

Fam. LARIDÆ.

49. Anous stolidus (Linn.).

"The Noddy Tern."

50. Sterna maxima, Bodd.

"*S. cayenensis.*"

51. Sterna dougalli, Mont.

52. Sterna fuliginosa, Gm.

53. Larus atricilla, Linn.

"This and the preceding four species of tern breed in the smaller of the Grenadines, principally upon the southern coast."

Fam. PODICIPITIDÆ.

54. Podiceps?

"*Podiceps.*

"Not seen by me, but described with sufficient accuracy to identify it as a *Podiceps.*"

"It was greatly my desire to visit the curious volcanic lake, near the northeastern coast, which is said to be well supplied with water-fowl. Strange as it may seem, in an island black with negroes, I could get no one to transport my necessary equipments, nor could I get a horse to carry me until too late for the purpose."

"The Grenadines!

"Consist of small islets and rocks forming a chain between St. Vincent on the north and Grenada on the south. Unlike the other islands, they are not volcanic, have little elevation, no running streams, and are rather barren.

"Bequia, Mustique, Cannouan, and Carriacou are the largest, and some portions of these islands are cultivated. The inhabitants subsist principally upon fish. Some cotton is raised; also sugar.

"From their conformation and from their barrenness it will be readily seen that the birds characteristic of the larger islands cannot be found here. The Ground Dove (*Chamæpelia passerina*) and the Turtle Dove (*Zenaida martinicana*) are very abundant, as the low scrub, with which a great part of the islands are covered, afford them protection and food, while the shallow water-holes give them the little necessary drink.

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"The Blackbird (*Quiscalus luminosus*) is very abundant. The Cuckoo manioc (*Coccyzus minor*) is also found here, as well as the *Certhiola* sp.?, the small Sparrow (*Phonipara bicolor*), the Mocking-bird (*Mimus gilvus*), the Green Heron (*Butorides virescens*), and the Chicken Hawk (*Buteo pennsylvanicus*). In one of the islands, Union, the Cockrico (*Ortalida ruficauda*) has been successfully introduced, and some attempts have been made with the American Quail (*Ortyx virginianus*). Some of the islands are in private hands, and have been stocked with deer and goats, which, having become thoroughly wild, afford excellent hunting.

"The sea birds frequent the small islands, and the outlying rocks of the larger, in myriads, where they breed.

"The Little Crested Humming-bird of Grenada and St. Vincent is also found in the Grenadines."

NEW YORK, *December* 10, 1878.

ON THE BREEDING HABITS OF THE SEA-CATFISH (ARIOPSIS MILBERTII).

By PROF. N. T. LUPTON.

VANDERBILT UNIVERSITY,
Nashville, Tenn., February 19, 1877.

Prof. SPENCER F. BAIRD:

About the middle of July, 1868, while on a visit to Mobile, Ala., I accompanied a party of friends on a fishing excursion to Fish River, a small stream on the eastern side of Mobile Bay, some 25 miles below the city. This river near its mouth widens out, forming Berwicks Bay, a sheet of water about three miles wide by four in length. This Berwicks Bay is a favorite fishing-ground, being the resort, especially after a storm in the Gulf, of immense schools of mullet. A great variety of other fish, such as the croaker, trout, redfish, &c., abound in this bay.

Captain Wemyss, who owned a large saw-mill on the bank of the river, and whose hospitality we were enjoying, kindly proposed to show us the different kinds of fish which frequent these waters, and to this end furnished a large seine and the necessary force to draw it.

While examining the fish my attention was called to several cat, each about 10 inches in length, which seemed to have a wonderful development of the throat. On examination, the enlargement was found to be caused by small catfish and eggs which were carried in the mouth. From the mouth of one I took out eleven small fish, each about an inch in length, and from another eight or nine eggs the size of a small marble, the eyes of the embryonic cat showing distinctly through the thin membrane enveloping the egg.

On inquiry made of several old fishermen in the neighborhood, and of a large number elsewhere, I have failed to find one who knew anything

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whatever of this habit of the catfish. If the observation is new, and it deserves to be placed on record, you are at liberty to use this in any way you may deem proper.

Very respectfully,

N. T. LUPTON.

ON THE OCCURRENCE OF STICHÆUS PUNCTATUS, (FABR.) KRÖYER, AT ST. MICHAEL'S, ALASKA.

By TARLETON H. BEAN.

A single specimen of the species above named was collected June 29, 1874, at St. Michael's, Alaska, by Mr. Lucien M. Turner, who sent it to the United States National Museum. The species is now apparently for the first time recorded from the coast of Northwestern North America. The total length of the specimen is 145 millimetres (5$\frac{11}{16}$ inches). It has been compared with an individual of the same species from Greenland (probably from the Danish Colonies, as it was presented to the Museum by the Danish Academy), and another from Halifax, Nova Scotia, where it was taken September 4, 1877, by the United States Fish Commission, at the mouth of the harbor, in 20 fathoms of water. In order to show at a glance how the St. Michael's specimen differs from the other two, the proportions of the different parts of the body of all the specimens to the total length without caudal are exhibited in tabular form. The average proportions of the three individuals are given in another table, and they may serve as a basis of a description of the species. From this average the specimen from St. Michael's differs in the following particulars:

1. The maxillary is longer.
2. The mandible is longer.
3. The pectoral is longer.
4. The ventral is inserted somewhat nearer the snout.

In the number of anal rays, the Alaska specimen is intermediate between the other two. The differences indicated fall within the limits of individual variation, and in the absence of sufficient material it is not practicable to separate the St. Michael's example from the other two, even as a variety.

Stichæus punctatus is recorded from the coast of Greenland (Danish Colonies?), Newfoundland, Halifax, Nova Scotia, and St. Michael's, Alaska.

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Table of Measurements.

Current number of specimen	21,718.		4,588.		21,068.	
Locality	St. Michael's, Alaska.		Greenland.		Halifax.	
	Millimetres.	100ths of length.	Millimetres.	100ths of length.	Millimetres.	100ths of length.
Extreme length (without caudal)	125	.....	101	.....	160	.....
Length to end of middle caudal rays	145	(5 11/16 in.)	117	.....	184	.....
Body:						
Greatest height	.....	17	.....	13	.....	16½
Height at ventrals	.....	12	.....	12	.....	13
Least height of tail	.....	7	.....	7	.....	6
Head:						
Greatest length	.....	22	.....	21	.....	22
Greatest width	.....	10	.....	10	.....	9½
Width of interorbital area	.....	2½	.....	2½	.....	2
Length of snout	.....	6	.....	5½	.....	6
Length of upper jaw	.....	8	.....	6½	.....	7
Length of mandible	.....	10	.....	8½	.....	9
Distance from snout to centre of orbit	.....	8	.....	7½	.....	7½
Diameter of orbit	.....	5	.....	5	.....	4½
Dorsal:						
Distance from snout	.....	21	.....	22	.....	20½
Length of base	.....	78	.....	80	.....	80
Anal:						
Distance from snout	.....	45½	.....	46	.....	47
Length of base	.....	54	.....	55	.....	54
Caudal:						
Length of middle rays	.....	16	.....	15½	.....	14
Pectoral:						
Distance from snout	.....	21½	.....	22½	.....	22½
Length	.....	18	.....	16	.....	16½
Ventral:						
Distance from snout	.....	19	.....	21	.....	23
Length	.....	7½	.....	8	.....	6½
Branchiostegals	VI	.....	VI	.....	VI	.....
Dorsal	48	.....	50	.....	48	.....
Anal	35	.....	37	.....	33	.....
Caudal	21	.....	22	.....	.....	.....
Pectoral	15	.....	15	.....	15	.....
Ventral	3	.....	3	.....	3	.....

Table of Proportions.

Number of specimen	4,588.	21,718.	21,068.
Locality	Greenland.	St. Michael's.	Halifax.
Length of head in total length without caudal (times)	4.76	4.55	4.55
Interorbital area in total length without caudal (times)	.40	.40	.50
Snout in total length without caudal (times)	17.65	16.67	16.67
Upper jaw in total length without caudal (times)	15.38	12.50	14.29
Mandible in total length without caudal (times)	.12	.10	.11
Distance of dorsal from snout in total length without caudal (times)	4.55	4.76	4.88
Base of dorsal in total length without caudal (times)	1.25	1.28	1.25
Distance of anal from snout in total length without caudal (times)	2.17	2.20	2.13
Base of anal in total length without caudal (times)	1.82	1.85	1.85
Distance of pectoral from snout in total length without caudal (times)	4.44	4.65	4.44
Length of pectoral in total length without caudal (times)	6.25	5.55	6.06
Distance of ventral from snout in total length without caudal (times)	4.76	5.26	4.35
Length of ventral in total length without caudal (times)	12.50	13.33	15.38
Branchiostegals	VI	VI	VI
Dorsal rays	50	48	48
Anal rays	37	35	33
Caudal rays	22	21	Imperfect.
Pectoral rays	15	15	15
Ventral rays	3	3	3

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AVERAGE OF THE SPECIMENS.

Length of head in total length without caudal (times)	4.62
Interorbital area in total length without caudal (times)	43
Snout in total length without caudal (times)	17
Upper jaw in total length without caudal (times)	14.05
Mandible in total length without caudal (times)	11
Distance of dorsal from snout in total length without caudal (times)	4.73
Base of dorsal in total length without caudal (times)	1.26
Distance of anal from snout in total length without caudal (times)	2.17
Base of anal in total length without caudal (times)	1.84
Distance of pectoral from snout in total length without caudal (times)	4.51
Length of pectoral in total length without caudal (times)	5.95
Distance of ventral from snout in total length without caudal (times)	4.79
Length of ventral in total length without caudal (times)	13.74
Branchiostegals	VI
Dorsal rays	48–50
Anal rays	33–37
Caudal rays	21–22
Pectoral rays	15
Ventral rays	3

U. S. NATIONAL MUSEUM, *Washington, December* 4, 1878.

REPORT ON THE LIMPETS AND CHITONS OF THE ALASKAN AND ARCTIC REGIONS, WITH DESCRIPTIONS OF GENERA AND SPECIES BELIEVED TO BE NEW.

By W. H. DALL.

The following report has been drawn up chiefly from material collected in Alaska from 1865 to 1874 inclusive, but includes references to the few Arctic or northern species which are not common to Alaskan waters.

The northwest coast of America, which I have already stated I have reason to think is the original center of distribution for the group of *Docoglossa*, at least of the littoral forms, is unquestionably the richest field where these animals may be found. This is true not only in regard to the number of species, but also in regard to the number of peculiar and remarkable forms of genera and subgenera; in one sense, the developement and specialization of the soft parts, even at the expense of the shelly envelope, is a test of relative rank in restricted groups. Hence it may not be erroneous to regard the gigantic *Cryptochiton* as representing the highest developement of the group, though belonging in the section of Irregular Chitons; especially as paleontological evidence shows part of the section of Regular Chitons to represent the Chitons of paleozoic times and embryonic structure. As was pointed out in my previous paper on the phylogeny of the *Docoglossa*, the embryonic types, represented by *Lepeta* and *Cryptobranchia* among the Limpets, are represented on the N. W. coast by a larger number of species and by larger individuals than in any other region; so the embryonic types of *Chitonidæ* in the same district are here to be found more largely repre-

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sented in species and by larger individual species than anywhere else in the world. That this is also true of other groups of Mollusca, such as the *Fissurellidæ*, *Trochidæ*, *Haliotidæ*, *Buccinidæ*, and others, I hope hereafter to be able to show conclusively.

Since I have elsewhere* treated in considerable detail the Limpets of the northwest coast of America, I shall here present only a list of the species with such additional material as six years' study and collections have brought to hand, and reserve for the Chitons a more detailed account. This is the more desirable, since this group has been very generally neglected, and even the most modern descriptions often fail to give those details by which a species can be assigned a place among its proper associates.

Had the late Dr. Carpenter survived, the report on this group would have been delegated to his more able hands; the material passed for a time into his possession, but his premature demise came to pass before anything except the identification of the already known species and some correspondence on the general subject had been accomplished. For sufficient reasons, it is not to be hoped that his materials for a monograph of the group, as a whole, will be published for some time, and I have therefore been authorized to use some extracts from his MSS. which have a direct bearing on the particular species here referred to. I have in all cases followed him in framing descriptions of species, and have quoted his original descriptions (giving due credit) where it was practicable. Research into several undecided questions has resulted in decisions in several cases different from those he had anticipated; but in which conclusions, from my intercourse with him, I have no doubt he would have eventually coincided, had he lived to follow out the investigations he began.

The caution, in assigning values to the higher divisions of this singular group, which was exercised by Dr. Carpenter, has been fully justified, and it does not seem that our knowledge of them is yet sufficiently complete to authorize definite conclusions. Examination of the radula, heretofore almost wholly neglected, emphasizes the necessity of continued caution. The numerous characters presented by the insertion-plates, the characters of the girdle, branchiæ, sexual organs, developement, radula, and the presence or absence of pores on the upper surface, are apparently interchangeable to a greater extent than would be supposed. In this sense they present a remarkably homogeneous group. In spite of numerous important and peculiar features, their position, as a subdivision of the Gasteropodous Mollusca, appears to me to be definitely settled beyond any reasonable question. By very numerous characters, their continued association in the neighborhood of the Limpets as their nearest (if still somewhat distant) relatives appears to me to be assured, and requires only some knowledge of the embryology of

*"On the Limpets," &c., Am. Journ. of Conchology, vi, pp. 228–282, pl. 14–17, April, 1871.

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Limpets to be placed on a definite footing. That any classification founded on single characters, or a small proportion of characters, may result unfavorably to this view, I am not prepared to deny; but whatever advantages such a method may present, it is not one which appears worthy of the name of philosophical treatment, or likely to endure as our knowledge becomes more definite and extended.

It is not yet certain how far the indications of the dentition may be relied on in this group, as will presently be shown. Whether, as in the implacental mammalia, the teeth will prove an insecure basis for generalization beyond genera, or whether a classification based upon them will present a more favorable aspect when a larger number of species have been examined, it is yet impossible to say. What is known presents some anomalies to which the key is at present wanting. So far as investigation has proceeded, greater weight seems due to the character of the shelly plates than to any other single feature, and the tentative classification of Dr. Carpenter is in this way justified. Any division of the group into families seems premature without more light. The genera and subgenera are, in most cases, reasonably sure on their foundations; but on an examination of the dentition, such as is contemplated by Dr. Troschel, and is urgently needed, much will depend. But until this has been made very full and thorough, it is to be hoped that generic distinctions based on the teeth alone may be suspended, or at least left without names.

A sketch of the outlines of Dr. Carpenter's classification will not be out of place here, but is best preceded by an explanation of certain terms used in description.

In all Chitons with exposed valves, the seven posterior valves are divided more or less plainly by lines radiating from the apex to the opposite anterior edge. The sculpture of the posterior triangular areas (*areæ laterales*) thus cut off is almost uniformly like that of the whole anterior valve and the part behind the apex (*mucro*) of the posterior valve. The central or anterior triangles (*areæ centrales*) are sculptured alike, but generally in a different pattern from the sides. The *areæ laterales* are usually raised a little above the rest. It is very rare that the bounding diagonal lines cannot be traced, and they usually correspond to the slit in the side-*laminæ of insertion*, which project into the zone or girdle, and are free from the peculiar porous superficial layer characteristic of the exposed test in the whole group of Chitons. This superficial layer usually projects over the anterior and posterior laminæ of insertion or teeth (*dentes*) in the first and last valves, forming what Dr. Carpenter terms the 'eaves' (*subgrundæ*). These may exhibit the spongy character of the layer of which they are formed, or may be varnished over at their edges with a thin layer of true shelly matter, as in the Ischnoid group. In the typical Chitons they are short, leaving the teeth projecting; in the Mopaloids they are hardly developed, and in some groups they quite overshadow the teeth.

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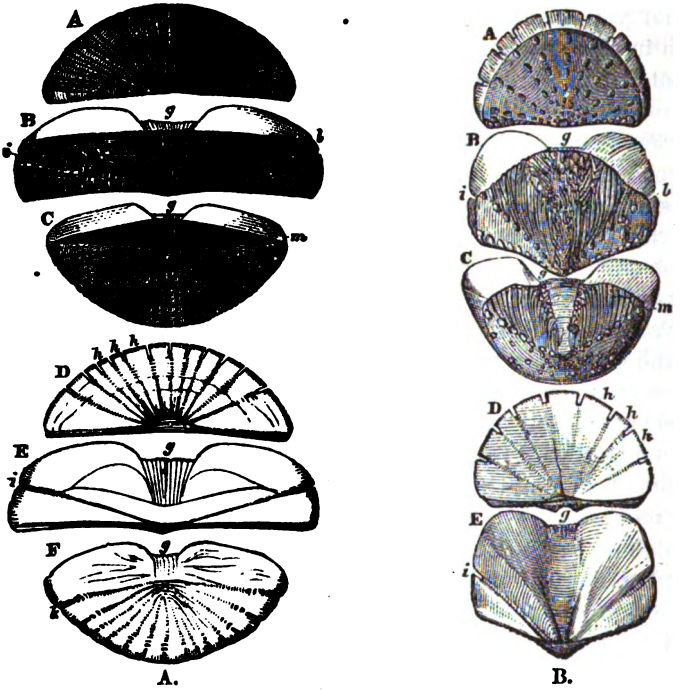
In many genera there is a small portion of peculiar sculpture marked off along the ridge of the median line of the back. This is the *area jugali*, and corresponds to the *sinus* or space between the inner terminations of the two anterior *sutural laminæ* which pass forward from each of the posterior seven valves under the valve in front. The sutural laminæ are also destitute of the porous layer. The *sinus* is either open,



A. B.

FIG. A.—*Chiton olivaceus* Sowerby. *A*, anterior, *B*, middle, and *C*, posterior valve, seen from outside; *D*, *E*, *F*, the same valves, from within; *g*, *sinus jugali*, between the two anterior sutural laminæ; *h*, *h*, *dentes*, or teeth between the notches or slits in the laminæ of insertion; *i*, *k*, slits in lamina of insertion; *l*, outer end of line separating the *area lateralis* of the middle valve from the *area centralis*; *m*, end of the line separating the central area of the tail-plate from the posterior portion; the angulation of this line in the median line of the animal forms the *mucro*.

FIG. B.—*Enoplochiton niger* Barnes.—*A*, anterior valve from above, showing the laminæ of insertion and notches; *B*, the middle valve, from above; *g*, *sinus jugali*, in front of the jugum, or *area jugali*, and between the two sutural laminæ; *i*, *l*, notches between the sutural and insertional laminæ, and forming the ends of the line forming the anterior border of the lateral and posterior border of the central areas; *C*, tail-plate; *g*, *sinus jugali*; *m*, end of line separating the areas; *D*, anterior valve, from within, showing teeth (*h*, *h*) and notches of lamina of insertion; *E*, middle valve, from within; *g*, jugal sinus, between the sutural laminæ; *i*, notch, between sutural lamina and side-lamina of insertion.

or part of the jugular area projects forward between the sutural laminæ, forming a false apex; or a keystone-like piece, either solid, or fimbriated like the teeth of a comb, may exist between the laminæ and partly fill the sinus. The *sinus posticus* is the wave, notch, or indentation which in some genera is found in the posterior edge of the posterior valve. In

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some of the Irregular Chitons, *posterior sutural laminæ* are found, but these are very exceptional.

In the vast majority of genera, the side-laminæ of insertion have only one slit on each side of the valve; occasionally a valve may be abnormal in a regular species, and the number of slits in the anterior and posterior valves may vary within moderate limits.

The girdle (*zona*), which is distinct from the true mantle, is variously ornamented with scales, bristles, spines, down, or hairs, either singly or combined, which exhibit most beautiful forms tolerably constant in generic groups, and worthy of a special and exhaustive research.* These may be solid or hollow, shelly or keratose, single or combined in bunches, and in some forms are hollow and annulated, precisely like the setæ of Brachiopods. In certain genera they issue from pores, usually at the sutures, and these pores have a certain value as a systematic character, but much less than has been assigned to them by some authors.

The Chitons in the adult condition are destitute of eyes or tentacles, and exhibit evidences of degradation anteriorly. The anus is always median and posterior; on each side of it are the sexual openings or *fenestræ*. These may open by several slits or pores directly into the perivisceral cavity, or form the aperture of a sexual duct. The gills, as pointed out by me in 1871, are composed of a row of branchiæ, starting from near the tail, extending a third (*posticæ*), half (*mediæ*), or all the way (*ambientes*) toward the head, each leaflet of which corresponds to a whole branchial plume, such as is found in *Acmæa*. Each single gill is conical, with the lamellæ projecting inward, somewhat resembling in outline the shell of *Carinaria*. The mantle, inside the coriaceous margin of the girdle, often forms a lamina or fringe. A lappet called the 'veil' generally surrounds the front of the rostrum, which has sometimes a double veil. The muzzle is semicircular, usually plain, and exhibits a tendency to form a lobe at the two posterior corners. The radula is always present. Like the Limpets, Chitons possess a laminated crop before the true stomach. The nervous system, beautifully worked out by Brandt† in a paper singularly overlooked by most writers, is also comparable with that of *Patella vulgata* (simultaneously examined and figured), though by no means identical. The cephalic ganglia appear to be suppressed, forming another evidence of the degeneration or want of developement of the cephalic region in this group. A valuable paper by Dr. H. von Ihering of Erlangen, I have not yet had access to, but understand that it contains a description of the nervous system of Chitons.‡

Cf. Reincke, Beitr. zur Bildungsges. der Stacheln, u. s. w.; Zeitschr. für Wiss. Zool. 1858.

† St. Petersb. Imp. Acad. Sci. Mélanges Biolog. vii, p. 146, f. 2, 1838, *Acanthochiton fascicularis*.

‡ Since this paper was written, I have been kindly furnished by Dr. v. Ihering with copies of his extremely important work on the "Anatomy of the Nervous System and the Phylogeny of the Mollusca," and two valuable papers concerning the *Chitonida*

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Since differences exist between the results obtained, in working out the nervous system of *Chiton*, by different naturalists, it is thought best

(from Gegenb. Morph. Zeitschr. iv, April, 1877), and their allies. In the first-mentioned work, the author comes to somewhat different conclusions from Brandt in regard to the details of the nervous system, both in *Chiton* (*cinereus*) and *Patella vulgata*, though the differences are not so fundamental as a first glance at the somewhat diagrammatic figures might suggest. In the "Anatomy" the author considers as a separate phylum (*Amphineura*) the Chitons, together with *Neomenia* (*Solenopus* Sars) and *Chætoderma*, placing them under *Vermes*, while the *Docoglossa* and most of the Prosobranchiate Mollusks form the third phylum (*Arthrocochlides* Ihr.) of the Mollusca. In the later paper on *Neomenia*, &c., Ihering seems disposed to concede a more intimate relation between the *Fissurellidæ* and Limpets on the one hand and the *Chitonidæ* on the other. His figures would indicate a more near relation between *Fissurella* and *Chiton* than between the latter and *Patella*, so far as the nervous system goes. It must be borne in mind, while considering his differences with Brandt in regard to *Chiton*, that the species examined by Ihering, *Trachydermon cinereus* Lowe, is one of the lower forms of *Chitonidæ*, closely related to the lowest existing genus, *Leptochiton*; while that dissected by Brandt belongs to the higher of the two great groups of *Polyplaciphora*. It would be natural, therefore, that the nervous system of the former should more nearly resemble the wormlike forms from which the Chitons may have come out, and that the latter should be closer to the Limpets, which, though less specialized, I can hardly doubt sprang from the same original stock. It is also within the bounds of probability that in the details of the nervous system, as in all other details, the characteristic variability (within certain limits) of the group of *Chitonidæ* may assert itself.

I cannot refrain from expressing, here, my conviction that there are at least two points of view from which the classification of these invertebrates may be regarded in a scientific sense. The army of embryologists, to whom, in these later days, we owe so much new light, with the enthusiastic self-confidence born of successful innovations, as a general rule deny the existence of more than one scientific point of view. More than one of them has dogmatically asserted that science in natural history now consists in the study of embryology alone, and phylogenetic classifications deduced therefrom. It has been said that careful and minute anatomical investigations and histological researches based upon adult animals no longer deserve the name of science. It has even been averred that the only object of classification now is the representation in words of phylogenetic diagrams, or the derivative relations of animals according to the particular author's hypotheses. It is therefore somewhat refreshing to find that a school of naturalists is gradually forming, for whom anatomy as compared with pure embryology has still some attractions.

No one denies that a classification may be grounded exclusively upon the embryonic developement, and may possess a high scientific character, nor that among the higher animals such a basis must form a principal part of the foundation of any scientific classification which may be applied to them.

But what seems to be lost sight of by some of those who have escaped from the bonds of the Cuvierian system, is the fact that some of the derivatives from two parallel stocks may resemble one another more closely than specialized forms derived from the same stock; that in the early stages of the developement of organisms before well-defined lines of specialization for the adults had been fixed by natural selection and other factors, variations were necessarily rather the rule than the exception among the embryonic forms, even when of common origin; that the missing stages, "abridged developement," etc., reported by most later embryologists, are, in all probability, the traces of the original vacillations and accelerations of primal evolution, and that a truly philosophical classification must take these things into account.

It must not be forgotten that we have to deal with results as well as methods, with

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to reproduce here the accessible material, and wait for more information before considering the subject as fully decided.

The figure here given, after Brandt's researches on *Acanthochiton fascicularis*, may be supposed to present the general features of the nervous system in the higher members of the group.

The accompanying figure (C²) of part of the nervous system of *Chiton*

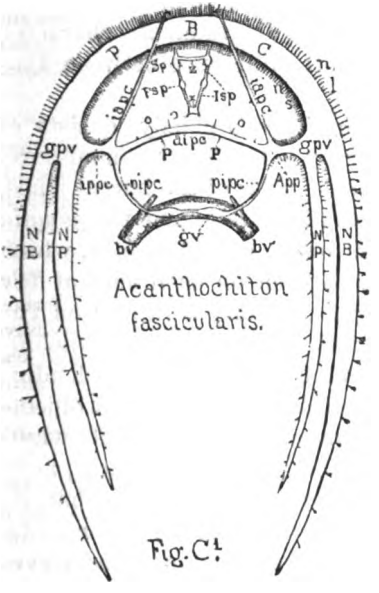

Fig. C¹

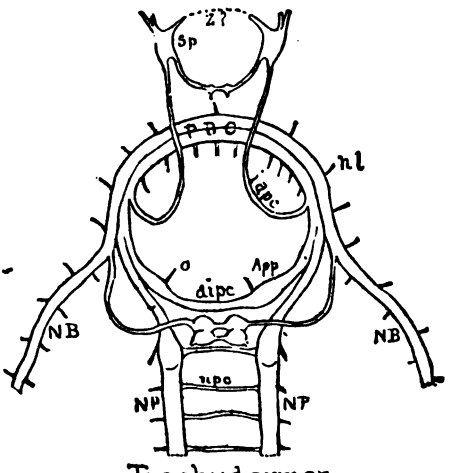

Fig. C².

FIG. C.—*PBC*, pedo-branchial commissure; *NB*, nervi branchiales; *NP*, nervi pedales; *nl*, nervi labiales, small filaments numerous and hardly traceable; *ns*, nervi pharyng. superiores; *gpv*, ganglia pedo-visceralia seu pedo-branchialia; *iapc*, inter-anterio-pharyng. commissure; *ippc*, inter-pedo-pharyngial commissure; *App*, anterior inferior pharyngial ganglia; *aipc*, anterior inferior pharyngial commissure; *pipc*, posterior ditto; *gv*, ganglia vascularia, resting on *bv*, a blood-vessel (the small commissure separating these ganglia is called by Brandt the intervascular commissure); *sp*, anterior superior pharyngial ganglia; *Psp*, posterior superior pharyngial ganglia; *x*, superior posterior post-pharyngial ganglion; *z*, anterior superior pharyngial commissure; *Isp*, inter superior pharyngial commissure; *oo*, anterior inferior pharyngial nerves; *pp*, posterior ditto.

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termini as well as routes, with adults rather than embryos. We do not live in a world of embryos alone, in any but the most metaphysical sense. We cannot learn the relations of animals, as they are, to each other from the embryological phylum alone, any more than we could understand the nations of modern Europe and their political boundaries from a map of the Aryan migrations.

To apply this reasoning to the matter in hand in detail would require much more space and time than are at present available. Yet it may be said that we have high authority for considering that the mollusks and worms are derived from a common origin, and that, in fact, the former derive their characteristic features from the tendency to specialization and developement within the compass of a single segment, or a very small number of segments, while the worms are characterized rather by reduplication of more simple segmental parts in great number, but small variety among themselves. Various groups of mollusks may owe their greater or less participation in fea-

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(*Trachydermon*) *cinereus* is from Ihering. It will be seen that there are comparatively few important differences between the two; the pedal commissures (*npc*); the separation of the ganglia *App* from close connection with the anterior (*iapc*) and posterior (*pipc*) loops; the larger and more conspicuous buccal ganglia (*Sp*) and the less complete coalescence of the strands forming the pedo-branchial commissure (*PBC*) are the most conspicuous features. Further research is required to determine how much of these differences is due to the diagrammatic character of the figures, and how much to the systematic difference between *Trachydermon* and *Acanthochiton*.

The nervous system of *Acanthochiton fascicularis* chiefly consists of two large angular ganglia bound together by a large flat commissure. These two principal ganglia, which lie on the sides of the buccal mass, may be taken as a consolidation of the *ganglia pedalia* and the *ganglia branchialia seu visceralia;* thence springs out a *nervus pedalis*, which supplies the foot and muscles with minute rami on each side of the nerve; also a *nervus branchialis*, which passes along a furrow on the inner edge of the mantle, giving out secondary rami to the branchiæ. The cerebral ganglia are wanting, unless we consider with Middendorf that they form part of the pedo-branchial commissure. Brandt objects to this view on the ground that the commissure throughout its whole breadth is similarly formed and gives out similar nerves; namely, *nervi labiales* from in front, and a multitude of minute nerves to the pharynx behind. As Chitons have in the adult condition neither eyes nor tentacles, so the absence of these ganglia (from which in other forms nerves are given out to those two organs only) seems very natural. This commissure may also be called the *pedo-branchialis*, and it may correspond with the *commissura cerebralis*, from which similar nerves have been demonstrated to spring. This commissure also presents resemblances to the nerves and ganglia of the stomato-gastric system, common to many gasteropods, in its intense yellow color. A commissure binds each pedo-branchial ganglion with a little inferior pharyngial ganglion, and the same also connects these inferior pharyngial ganglia with one another by an inferior interpharyngial commissure (as in *Patella vulgata*,

tures, generally more characteristic of *Annulosa*, from the different times at which they started from the common stock on an independent career of specialization.

All this in no wise authorizes the combination in one group of worm-like mollusks and molluscoid worms. The writer has persistently opposed such ill-considered conglomerations as wholly unphilosophical. Even were there embryological identity, which no one has claimed, such a course seems to him to indicate an ignorance of the meaning of terms in systematic nomenclature, or the confounding of the two starting points for classification, to which allusion has been made. He will even venture to predict that when the anatomy and developement of two hundred, instead of two, species of Chitons and Limpets, are worked out, a single phylum will express their relations to the worms, to each other, and to the other true gasteropods; and to assert that, in his opinion, nothing is so likely to conduce to this simplification than the continuation and amplification of the really admirable work upon which Dr. v. Ihering and others have of late been engaged.

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in which also it is bow-shaped, with the concavity forward), and through still another commissure with the two upper pharyngial ganglia.

From each inferior pharyngial ganglion, a long, thin commissure extends, binding it with a large subovate ganglion, which may be called the posterior inferior pharyngial ganglion; and the others must then take the name of the anterior inferior pharyngial ganglia. The two former are connected by a little arched commissure, and lie behind the aorta. From the anterior inferior pharyngial ganglia three pairs of nerves proceed before and one behind the buccal muscle. The anterior superior pharyngial ganglia are connected by five commissures with each other and other ganglia. From the superior anterior pharyngial ganglia proceed two small nerves for the upper buccal muscles. The posterior superior pharyngial ganglion sends out a small nerve to the upper lateral buccal muscle, and from the superior posterior postpharyngial two small nerves are traceable to the radula.

Circulation.—Our knowledge of this is due to Middendorf, to whose ponderous and not very satisfactory monograph of *Cryptochiton Stelleri* the student is referred. More light is needed on this subject.

Sexual Organs.—The *Chitonidæ* are of two sexes, wherever they have been examined by the writer, and the number of forms which has passed under review is so large that there can be no doubt this is the rule throughout the group.* The histological characters of the male and female gland resemble those of the Limpets, at least in general appearance. The most superficial observer can separate the sexes when the characters have once been called to his notice. It is true that Middendorf found, or believed he found, spermatozoa in the ovisac of *Chiton* (*Symmetrogephyrus*) *Pallasii*, but this may be accounted for in another way; and I may say, definitely, that I have examined both males and females of that species. The glands of both sexes open on each side of the anus, in some species quite close to the latter, in others much further forward and in advance of the most posterior branchiæ. The opening may be a simple pore or small aperture forming the termination of a sexual duct, or it may consist of what I have termed a *fenestra*, or elongated slit, crossed by several bands of tissue, so that there may seem to be from two to seven oblique slits, each extending partly behind the front end of the slit behind it. In these cases, I have not been able to determine the existence of a continuous oviduct, and am inclined to believe that the ova may pass from the oviduct into the perivisceral cavity, and from thence, through the fenestræ, reach the exterior.

The ovisac and spermsac are more or less convoluted and asymmetrical. They are probably the result of fusion of two original glands in the median line, if, indeed, they are not partly separated in some species, as seemed in one or two instances to be the case. The ducts, when carefully examined, are seen to spring from the anterior abdominal side of the sac, not from the posterior end.

* Dr. v. Ihering arrives at the same conclusion.

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Clark observed the eggs being ejected in a sort of stream from the openings into the water and settling in loose clusters on adjacent objects. Verrill and Carpenter have confirmed these observations, and add that the hinder part of the foot is so raised as to form a sort of funnel, out of which the eggs emerge. But these eggs, in some cases at least, are already impregnated, and somewhat far advanced in developement before they leave the oviduct. I have myself observed, in several individuals which had been some years in spirit, eggs developed as far as the first stage figured (47 *a*), which had never left the ovisac. In this connection it may be observed that, if the sperma be ejected into the water, there is nothing to prevent the spermatozoids from entering the wide apertures of the fenestræ (in some species at least), and thus impregnating the eggs in the ovary. In this way may be explained the presence of spermatozoa in the female *Chiton Pallasii* noted by Middendorf. In some species with very small ovarian openings, this internal impregnation would be attended with more difficulty. In some species, a large so-called "slime gland" is present, lying under the middle line of the ovisac. Gray states that in some Chitons the egg is enfolded in a thick, vesicular, folded envelope, but I did not notice anything of the kind in those I examined. I observed no micropyle, but having only specimens hardened by long immersion in spirits these observations cannot be deemed conclusive. In all the species specially examined to determine the character of the ova, the eggs were spherical, with a rather tough skin, quite smooth, with no trace of lime in it, and apparently in no way attached to the walls of the ovary when ripe.*

Developement.—Nothing later than the brief but admirable researches of Lovén, now thirty years old, has come to hand. His figures are here reproduced, with a summary of what has been observed, to stimulate further enquiry in those favorably situated.

The Chitons differ from most Mollusks in that the shell does not appear on the embryo until some time after they are hatched. In this connection, the observations of Krohn on *Marseniidæ* may be referred to.

The embryo of *Chiton cinereus* is oval, with no trace of shelly valves or depressions for them, and is divided into two nearly equal parts by a transverse depression, the margins of which are ciliated. On the middle of the upper part is a tuft of filaments which move slightly. At each end of the depression are two dark points, representing the eyes.

The young when hatched (Fig. 47 *b*, *c*) become more elongated, the front part is finely ciliated, and the tuft occasionally vibrates. The hinder part extends more rapidly and becomes conic. The back is marked by seven furrows; between these the first rudiments of the shelly

* Dr. v. Ihering describes the egg of *C. squamosus* as covered with peculiar thorns, five-sided solid columns, expanding at the distal end into a cup whose edge is cut into five points. *C. Cajetanus* and *fascicularis* had eggs covered with a grooved and irregularly furrowed membrane, as described by Gray, but without thorns. The vesicular membrane thus may be considered as a chorion. In the immature stages, the eggs are enclosed in follicles of the tissues of the ovisac.

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valves make their appearance in the form of fine granulations. Soon after this, the animal can crawl as well as swim, and the mantle becomes separated from the foot by an indentation. The eyes are placed on the ventral side, and hardly visible from above. The upper anterior part of the animal is marked with acute tubercles. The mouth is not yet visible. The valves first appear in the form of seven narrow bands with irregular margins; the tuft disappears. The head and mouth then develope (Fig. 47 *e*). The eyes are on distinct lateral protuberances. No gills have appeared. The mantle and front valve advance over the head (Fig. 47 *f*) and eyes; the tuberculated area in front of the valves is gradually diminished, and the tail-plate appears behind the seventh. The valves are at first irregular, but increase from below, and deep notches, persistent in the adult, are formed on the front edges, one on each side. It will be seen that the valves are formed each in one piece, and not by the coalescence of parts corresponding to the various areas of the adult valve. There are eight valves in all Chitons, though monsters with seven valves have been occasionally reported; they lack the horny jaw possessed by Limpets.

Renal Organs.—Middendorf indicated the existence of a renal organ in the delicate glandular structure which in some species covers the upper posterior surface of the foot below the viscera. This does not seem to be uniformly present; at least, I did not detect it in some cases, and I failed to find any excretory opening. It is probable that this exists, but the contraction of the tissues of my specimens by alcohol may have obliterated it.* Schiff in *C. piceus* did not detect any renal organ, and unless in an abortive condition it seems probable that it is not always present.

Dentition.—The dentition of the Chitons has received hardly any attention. The only figures which have been given, so far as known to me, are those of *C. lævis* and *C. cinereus* by Lovén† in his original paper, the latter of which has been copied by Gray;‡ a figure, intended to represent the radula of *C. Stelleri*, by Middendorf;§ of *C. piceus* by Schiff;‖ of "*C. marmoratus*" by Eberhard;¶ and a figure of *Chitonellus* sp. by Gray.‡ Of all these only the figure of Lovén possesses any value, the others being more or less erroneous, or conveying an erroneous impression. Even the number of teeth is not correctly represented by any one but Lovén. On the basis of the teeth, the Chitons were combined with the Dentalia and Limpets in the order *Docoglossa* by Troschel, a proceeding justified by that single character; for the characteristics of

* Dr. v. Ihering has succeeded in finding an orifice immediately below the anus, in some species.

† Ofv. K. V. Akad. Forh. June 9, 1847, t. 6.

‡ Guide to Brit. Mus. 1857, pp. 182, 187.

§ Beitr. Mal. Ross. i, pl. iii, f. 11, 1847.

‖ Zeitschr. Wiss. Zool. ix, pl. ii, Beitr. zur Anat. v. *Chiton piceus*.

¶ Programm Herz. Realschule zu Coburg, 1865, f. 77. (Since the above was written, Prof. Sars has figured the dentition of several species.)

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the teeth in composition and general form (though not in number) are somewhat similar to one another and differ from all other groups much more than they differ among themselves. But other characters of greater importance seem to turn the scale unequivocally in favor of a somewhat wide separation of these groups, and the term *Docoglossa* was adopted by the writer some years since for the order containing the Limpets alone.

The teeth agree in number and in general character in all the genera and subgenera of Chitons which I have been able to examine; comprising about half of the groups recognized by the late Dr. Carpenter. No large group of genera or subgenera remains of which some form has not been studied. Hence we may reasonably infer, until the contrary is proved, that all the genera agree in the most essential characters of the dentition. Some doubt exists in my own mind as to the proper distribution of the eight side-teeth into true laterals and uncinals, since the fifth from the centre is constantly spatulate, yet separated from the cuspid teeth by two boss-like or non-cuspidate teeth resembling uncini. The formula therefore may be read either as

$$\frac{1}{3+1+2+2\times 2+2+1+3}, \quad \frac{1}{3+5\times 5+3}, \text{ or } \frac{1}{6+2\times 2+6}.$$

The most natural division is into six uncinal and two true laterals. For convenience in description, I shall term the spatulate third uncinus the *major uncinus*, the second lateral the *major*, and the first the *minor lateral*. The "inner" side of a tooth is that toward the middle line of the radula. In all Chitons examined, there is a simply cuspid rhachidian tooth, and on each side a translucent minor lateral of varying form; a major lateral larger than any of the other teeth with a conspicuous black cusp, which may have from one to four denticles; two boss-like or thickened uncinal plates of irregular shape; a twisted spatulate uncinal and three scale-like or slightly thickened external uncini. With the exception of the spatulate uncinus (which is abortive in a very few species), none of the uncini are much raised above the plane of the odontophore, and none present any characters of importance. The characters of the other teeth, though preserving a tolerable uniformity within the particular subgenera, so far as observed are rather variable within a certain narrow range, and on the whole it would be premature to say that they offer more than specific distinctions.

The absence of any well-marked types by which the order might be divided into families, or even subfamilies, is very remarkable, and in this respect the variations of the dentition agree with the other characters of shell-plates, girdle, and internal structure. This has already been remarked as regards the girdle and shell by Dr. Carpenter, who recognized that even his chief divisions of the order into Regular and Irregular Chitons failed to possess distinct family value.

The only other dental formula which recalls in any degree that of *Chitonidæ* is that of *Triopa lacer* as figured by Gray in his Guide.

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The teeth of the Chitons are excessively difficult objects to make out, though some of the species are quite large. The teeth project strongly from the odontophore, so that only a small portion of any one tooth can be had in focus at one time. Moreover, they overlie one another to such an extent that part of them, especially the two inner uncini, are hidden from view. The radula has to be pulled to pieces, to get at the form of the individual teeth. They will, like the teeth of Limpets, disintegrate under prolonged boiling in *liquor potassæ*, so that it is difficult to clean the radula from adherent mucus or remains of food. The teeth on the anterior edge of the radula are always worn or broken by use; those at its posterior termination are of course immature and pulpy; the scaly uncini differ slightly in form with age. The rhachidian tooth is usually more or less embraced by the wings of the minor laterals, so that it appears as if set on a plate or in an open box, and must be disentangled before its form can be made out.

In these descriptions, the front of a tooth is taken to be the side opposite to that by which it is attached to the radula. The figures of dentition do not pretend to represent the transverse rows as they appear on the unbroken radula. On the contrary, the teeth are represented diagrammatically as they would appear if separated from one another, yet, as nearly as practicable, in their relative positions. Only in this way could any idea be given of their forms and number. A series of exquisite drawings, made by one of the best zoölogical draughtsmen living, for Dr. Carpenter, nearly led me into serious error, and have been totally rejected, because they represented only what could be seen without dismembering the radula. The diagrams given, if somewhat rude, are, it is believed, tolerably reliable, and the result of a surprising amount of work, considering their small number.

The rhachidian tooth, as has been stated, always has a simple cusp, which may possess a somewhat sinuous edge or a tendency to a median sinus. The points by which it is attached to the odontophore are darker than the rest, and, seen through the translucent shaft, modify its appearance. A side view of the tooth generally presents an S shape, and it usually projects from the surface of the radula in a conspicuous manner. The shaft and base have not been observed to present any ornamentation.

The minor laterals present many modifications of form which may be referred to one type fundamentally. They consist of two parts, a shaft, and wings bearing the same relation to the shaft that the sides of a leaf do to its midrib. One or both of the wings may be almost abortive, leaving only the shaft twisted into a cusp at its apex, or the edges of the wings may be bent over into a cusp at the top of the tooth, and a small process like a bud or button is thus sometimes formed on the outer upper angle of the tooth. The most common form is that where the teeth are somewhat leaf-shaped, with both wings partly developed. The outer wing aborts before the inner one. These wings meet the midrib at an angle with each other, and this angle is sometimes less than a right angle.

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Usually, the two inner wings nearly meet one another behind the rhachidian tooth, while the two outer ones extend toward each other before the rhachidian tooth. In the unbroken radula, the rhachidian teeth each seem as if enclosed or fenced in by this arrangement of the two adjacent laterals.

The major laterals show fewer modifications. They are always the largest and most prominent teeth on the radula. They consist of a recumbent shaft, which is partly hollow or excavated behind, crowned by a cusp whose opaque consistency contrasts strongly with the brown translucent shaft and other teeth. This cusp is usually black, or yellowish with a black margin. In some species, a peculiar areolated spot is visible on the margin, and this may exist in some species in which I have not figured it, as it is difficult to observe except with a very strong reflected light. It does not appear to mark a pore or indentation, but from its constant occurrence in some species must have a certain significance.

The cusp may be rounded, or ovate, or elongated and simple, or it may be divided into two, three, or four denticles of uniform or varying size. The value of these characters cannot yet be definitely stated; they can hardly yet be said to present more than specific value, so far as the number of cusps is concerned, yet the general features agree, for the most part, in the same or nearly related groups.

In *Leptochiton*, the cusp is greatly elongated, with a small secondary denticle on the inner side, which is abruptly turned up, and, on an ordinary view, resembles a spur or thorn set on the principal cusp. In general, the northern species show a tendency to elongated cusps, simple or divided; the tropical species, including the typical Chitons, a tendency to a rounded, simple cusp. The majority of all species, however, have a tridentate cusp.

The shaft and cusp are separated by a distinct line of demarcation where the color changes from black or opaque to translucent. The shaft tapers from the cusp to the lower extremity, which is usually a little expanded. Extending downward from the base of the cusp, the groove or tube in the back part of the shaft is clearly visible. There are thin expansions of the shaft on each side, and sometimes a median keel on the front of the shaft, which in several species is produced into a slender, translucent process, of lanceolate or varied form, extended somewhat inward (toward the rhachidian tooth) and upward toward the cusp of the tooth upon whose shaft it is borne. These processes are most strongly marked in the teeth of the typical Chitons.

The two inner uncini, between the major lateral and the spatulate or major uncinus, are very irregular in form, even on the same radula. They lie prone on the radula and possess no true cusps, though thickened and elevated into knobs of various form. The major uncinus rises from a very small base, which is twisted and bent under it (as if the tooth was kneeling), and has a twisted, slender shaft, which is expanded at its extremity into a spatulate or feather-formed cusp. The whole tooth

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is so twisted and bent that the distal ends of the major uncini, as a rule, are protruded between the cusps of the major laterals. In a very few species, chiefly of *Cryptoidea*, the shaft and cusp are abortive, leaving only the small base or knob from which they spring in other species. No very salient characters are afforded by the major uncini.

The outer uncini have essentially the same characters in nearly all the species. They are flat and scale-like, their edges free and overlapping slightly. The outer ones forming the edge of the radula are usually more transverse than the others. In *C. articulatus*, they are remarkably transversely extended.

It will be seen from this description that, except in their construction and chemical character, the teeth of Chitons are quite dissimilar to those of Limpets, or, indeed, any other described group.

While not affording grounds for generic distinction by itself alone, the dentition of Chitons, as far as yet investigated, confirms, in many respects, the classification adopted on other grounds by Dr. Carpenter. For instance, his separation of the northern *Tonicellæ* from the tropical *Toniciæ* of Gray, with which they have usually been united, is fully justified by differences in the dentition. It is possible that when the dentition of the majority of species is determined, some reformation in the limits of subordinate groups may be made practicable by its indications, but this is not yet the case.

The following list of the chief groups recognized by Dr. Carpenter, with the character of the dentition when known, will give a clue to the extent of the work done, and that which is still a desideratum.

A.—REGULAR CHITONS.

LEPTOIDEA.

Leptochiton Gray. (Type *L. asellus* Lowe.)

L. cancellatus Sby. Minor lateral reduced by abortion of the wings nearly to a simple shaft. Cusp of major lateral elongate bidentate; inner denticle much the smallest, spur-like; shaft simple; other teeth quite simple. Fig. 1, 1 *a*, showing major lateral from above. *L. rugatus* agrees.

Hanleyia Gray. (Type *H. debilis* Gray.)

H. mendicaria M. & Ad. Minor lateral normal, bi-alate; major lateral tridentate; major uncinus short, other uncini with thickened edges. Fig. 2.

Deshayesiella, *Microplax*, and *Hemiarthrum* not examined.

ISCHNOIDEA.

Trachydermon Cpr. (Type *T. cinereus* Lowe.)

T. ruber Lowe. Minor lateral normal, leaf-shaped, with the upper edge of the outer wing bent over into a sort of cusp; cusp of major lateral with one large and one small denticle on the inner side, shaft normal; major uncinus short, with a widely expanded apex with fine radiating grooves on the edge. Fig. 3; 3 *a* shows the major uncinus from below.

T. albus L. Minor lateral with small wings bent backward; shaft cusped at the top; major lateral bidentate, as in the case of *T. ruber*, but with the small denticle on the outer side; major uncinus long, spatulate. Fig. 4.

Trachyradsia, *Callochiton*, and *Stereochiton* not examined.

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Tonicella Carpenter. (Type *T. marmorea* Fabr.)

T. lineata Wood. Minor lateral with a long shaft, bi-alate, normal; major lateral with two small denticles on the inner side of the cusp and one large outer denticle, shaft normal; major uncinus spatulate, normal. Fig. 5.

T. marmorea Fabr. As in the last, but with only one small inner denticle on the cusp of the major lateral. Fig. 6.

T. submarmorea Midd. Minor lateral shaped like a ploughshare; other teeth much as in the last. Fig. 7.

Schizoplax Dall.

S. Brandtii Midd. (Type.) Minor lateral a broad shaft with a simple cusp, base with a groove or sinus, no wings; major lateral tridentate. Fig. 8.

Leptoplax not examined.

Chætopleura Shuttleworth. (Type *C. Peruviana* Lam.)

C. gemma Cpr. Rhachidian tooth broad and short; minor lateral normal, outer wing inconspicuous; major lateral tridentate, shaft keeled, keel with a small elongate cuspidate process. Fig. 9.

? C. Hartwegii Cpr. Minor lateral reduced to a broad cusped shaft with a remnant of an inner wing and a thickened base; major lateral tridentate, with no keel or process, shaft normal. Fig. 10.

Maugerella Cpr.

M. conspicua Cpr. (Type.) Minor lateral bi-alate, top of inner wing and shaft bent into a twisted cusp with a small process extending outward from the apex of the shaft; major lateral tridentate, shaft with a keel and cuspidate process. Fig. 11.

Spongiochiton not examined.

ISCHNOCHITONS.

Heterozona not examined.

Stenoradsia Cpr.

S. magdalenensis Hinds. (Type.) Shaft of minor lateral with a cusp and process, inner wing normal, outer wing inconspicuous; major lateral tridentate, with a keel and cuspidate process on the front of the shaft. Fig. 12.

Stenoplax Cpr.

S. limaciformis Sby. (Type.) Rhachidian tooth very small; minor lateral normal, shaft with a minute hook at the apex; major lateral with a simple cusp, shaft bearing a keel and cuspidate process; major uncinus very small. Fig. 13.

Ischnoplax Cpr.

I. pectinatus Sby. (Type.) Minor lateral with broad, stout, cusped shaft, inner wing expanded, outer wing reduced to a rudiment, with a linguiform process; major lateral with a simple rounded cusp, shaft with a triangular keel but no projecting process. Fig. 23.

Ischnochiton Cpr. ex Gray. (Type *I. longicymba* Quoy.)

I. cooperi Cpr. Minor lateral with the outer wing reduced to a button near the cusp of the shaft, inner wing small; major lateral with simple cusp, shaft with a keel, bearing a cuspidate process; major uncinus broad, spatulate, thicker near the edges. Fig. 15.

I. interstinctus Gld. Minor lateral composed of a shaft with large, twisted, hooked cusp, and possessing only slight rudiments of wings; major lateral tridentate, keeled on the shaft, with a spatulate process on the keel; uncini rugose, major uncinus sharply bent, strengthened by narrow ridges on the spatulate cusp. Fig. 16.

I. regularis Cpr. Teeth closely resembling those of *I. Cooperi*, but minor lateral with a small outer wing. Fig. 14.

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Ischnoradsia Cpr. non Shuttleworth.

I. trifida Cpr. Minor lateral with no outer wing, but a small process near the apex of the shaft, which may represent it; inner wing normal; major lateral shaft normal, cusp bidentate, with a spot behind the notch (Fig. 17 *a*); uncini rugose, normal. Fig. 17.

Lepidopleurus Cpr. non Risso.

L. Mertensii Midd. Minor lateral with no outer wing; shaft cusped at apex, inner wing normal; major lateral with a simple cusp, shaft normal, deeply channelled behind. Fig. 18. Fig. 18 *a* shows the appearance of the minor laterals and their wings extending behind the rhachidian tooth as they do when in their natural position.

Lepidoradsia Cpr. (*Lophyrus* pars Adams.)

L. australis Sby. Minor lateral with a singular mushroom-like cusp with rudiment of inner and no outer wing; major lateral bidentate, shaft keeled with spatulate process; major uncinus short, broad, other uncini rather small. Fig. 19.

Callistochiton Cpr.

C. palmulatus Cpr. Minor lateral with a narrow inner wing parallel with and no wider than the shaft, cusped at the top, outer wing absent or represented by a minute cuspidate process; major lateral with a simple cusp, shaft with an anterior keel bearing a sublanceolate process. Fig. 20.

Callistoplax, *Ceratophorus*, and *Newcombia* not examined.

Pallochiton Dall (= *Hemphillia* Cpr. MSS. nom. præoc.).

P. lanuginosus Cpr. Minor lateral normal, bi-alate; major lateral tridentate, shaft normal. Fig. 21.

LOPHYROIDEA.

Chiton Cpr. Lin. not Adams. Type *C. tuberculatus* Lin. (*Lophyrus* H. & A. Ad. not Poli).

C. articulatus Sby. Minor lateral with no outer wing, shaft small, narrow, prone, from which extends the greatly elongated cusped inner wing external to the rhachidian tooth; major lateral with a simple rounded yellowish cusp with a black margin marked by a peculiar spot; shaft normal, with an inner lateral expansion produced into a linguiform process; major uncinus broad, long, spatulate; outer uncinus transversely elongated. Fig. 22. Fig. 22 *a*, side view of rhachidian tooth.

C. Stokesii Brod. Minor lateral with expanded inner wing, shaft cuspidate, cusp twisted and outer wing reduced to a portion of this cusp or absent; major lateral with an elongated simple cusp, shaft thick, strong, keeled in front, keel bearing a blade-shaped process attached to the keel at two points, with a small foramen between them; major uncinus short, broad, somewhat plume-shaped. Fig. 24. Fig. 24 *a*, major uncinus, from below.

C. Cumingii Frembly. Minor lateral normal, with wings recurved above and on each side; major lateral with simple elongate cusp, shaft with a strong keel bent outward below and produced above into a strong spoon-shaped process; two inner uncini nodulose; major uncinus with a slender and rather straight shaft. Fig. 25.

C. assimilis Rve. Minor lateral; shaft with small or nearly abortive wings, base long and recurved; major lateral with a simple rounded cusp, a keel on the shaft bearing a spatulate process; major uncinus feather-shaped, the vane on the inner side. Fig. 26.

Tonicia Gray.

T. elegans Frembly. (Type.) Minor lateral leaf-shaped, normal, apex curved forward; major lateral with an orange, black-edged, rounded, simple cusp with a spot on the margin, shaft normal; major uncinus very much twisted and decurved, spatulate. Fig. 27.

Radsia, *Fannyia*, *Eudoxochiton*, and *Craspedochiton* not examined.

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ACANTHOIDEA.

Sclerochiton, *Francisia*, *Dinoplax*, *Dawsonia*, *Beania*, and *Arthuria* not examined.

Acanthopleura Cpr. ex Guilding.

A. spinigera Sby. (Type.) Minor lateral large, shaft long, cusped, wings long, narrow, linguiform; major lateral with a simple rounded cusp, shaft keeled, keel with a cuspidate process; inner uncini nodulose; major uncinus short, broad, thick. Fig. 28.

Lucia Gld.

L. confossa Gld. (Type.) Minor lateral twisted, peculiar, outer wing broad, recurved at tip, inner wing small, strengthened by a branch from the shaft (Fig. 29*a*); rhachidian minute; major lateral with a quadridentate cusp, shaft with its inner expansion terminating in a cuspidate process above; inner two uncini ridged; major uncinus feather-shaped, vane on the inner edge (29*b*). Fig. 29.

Corephium Gray (not Brown).

C. echinatum Sby. (Type.) Minor lateral with the shaft expanded above, with a cusp confluent with the upper edge of the small inner wing, outer wing small; major lateral with a rounded tridentate black-margined cusp bearing a spot on the middle denticle, shaft keeled in front, keel produced into a thin linguiform process; major uncinus asymmetrical, somewhat spoon-shaped. Fig. 30.

Nuttallina Cpr.

N. scabra Rve. (Type.) Minor lateral normal, bi-alate; major lateral normal, with plain shaft and tridentate cusp; major uncinus long, slender, with small expansion at the tip. Fig. 31.

Phacellopleura Cpr. ex Guilding.

P. porphyritica Rve. sp. unica. Minor lateral with an inner but no outer wing, otherwise normal; major lateral normal, with plain shaft and tridentate cusp; inner uncini nodulose; major uncinus normal, spatulate. Fig. 32.

B.—IRREGULAR CHITONS.

SCHIZOIDEA.

I have not been able to obtain the radula of any of the few species comprised in the genera *Lorica*, *Aulacochiton*, *Schizochiton*, *Enoplochiton*, and *Onithochiton*.

PLACIPHOROIDEA.

Placiphora Cpr. ex Gray.

P. Carmichaelis Gray (= *C. setiger* King and *Fremblyi* Brod.). Type. Rhachidian tooth with its edges folded inward. Minor lateral with a large narrow inner wing, small outer wing, and a median keel on the slender shaft; major lateral with a large tridentate cusp, shaft slender, normal; major uncinus with a small expansion at the tip. Fig. 33.

Euplaciphora, *Fremblyia* (= *Streptochiton* Cpr.), and *Guildingia* not examined.

MOPALOIDEA.

Mopalia Cpr. ex Gray.

M. ciliata Sby. (Type, = *muscosa* Gld. + *Hindsii* Gray.) Minor lateral normal, bi-alate; major lateral normal, tridentate with a plain shaft; inner two uncini ridged; major uncinus rather short, normal. Fig. 35, 35*a*.

M. Wossnessenskii Midd. (*Kennerlyi* Cpr.). Similar to the last with a longer major uncinus. Fig. 34.

Placiphorella Cpr.

P. velata Cpr. (Type.) Rhachidian very large; minor lateral unusually small, both normal; major lateral tridentate, normal. Fig. 36, 36*a*.

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Katherina Gray.

K. tunicata Wood. (Type.) Minor lateral thin and coalescent with the inner wing above, outer wing small; major lateral normal, tridentate; uncini ridged or knobby, except major uncinus, which is elongate and narrow. Fig. 37.

Acanthochiton Herrm. ex Leach. (Type *A. fascicularis* Auct.)

A. avicula Cpr. Minor lateral with the shaft branched at base, leaf-shaped; major lateral with tridentate cusp; shaft with triangular keel, of which the tip is bent outward; major uncinus short, normal. Fig. 38.

A. spiculosus Rve. Minor lateral normal, bi-alate; major lateral and other teeth much as in the last. Fig. 39.

Macandrellus Cpr. (Type *M. costatus*, Ad. & Ang.)

M. costatus? Ad. & Angas. Like *Acanthochiton avicula*, but the shaft of the major lateral normal without a keel. Fig. 40. Specimen from Port Jackson, Australia.

Stectoplax and *Notoplax* not examined.

CRYPTOIDEA.

Cryptoconchus Blainv.

C. monticularis Quoy. (Type.) Minor lateral normal, leaf-shaped, base geniculate; major lateral with tridentate cusp and plain normal shaft; a rugosity on the second uncinus projecting inward over the first; major uncinus slender, short. Fig. 41.

Amicula Gray. (= *Symmetrogephyrus* Midd., *Stimpsoniella* Cpr.)

A. vestita Sby. = *Emersonii* Couth. Gld. (Type.) Minor lateral bi-alate, normal; major lateral tridentate, with plain shaft, whose lateral expansions are bent backward to the radula, forming a vaulted hollow arch beneath the upper part of the shaft; major uncinus aborted. Fig. 43.

A. Pallasii Midd. (Type of *Symmetrogephyrus*.)* As in the last, except that the sides of the major lateral are bent forward, and the major uncinus is present and normal. Fig. 42.

Chlamydochiton not examined.

Cryptochiton Midd. Gray.

C. Stelleri Midd. (Type.) Minor lateral normal, leaf-shaped; major lateral with tridentate cusp and a small keel on the shaft; inner two uncini ridged, major uncinus aborted. Fig. 44.

Chitonellus Blainville.

C. fasciatus Quoy. (Type.) Minor lateral bi-alate, with a strongly curved shaft; major lateral normal, tridentate with a plain shaft; uncini more or less ridged, major uncinus nearly straight, long, slender, spatulate. Fig. 45, 45 *a*.

It will be seen that Gray's figure (here reproduced) is very erroneous, and seems to have been taken from the immature end of the radula.

FIG. D.—Teeth of Chitonellus, after Gray.

Choneplax, *Chitoniscus*, and *Cryptoplax* not examined.

Nomenclature.—The nomenclature of Chitons has suffered greatly from neglect of various writers to specify or adopt types of the genera they proposed or used. The neglect of internal characters in assorting species into genera has also been fruitful of difficulty; the Messrs. H. and

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A. Adams being among the greatest sinners in these respects. The revision of the nomenclature by Dr. Carpenter with the co-operation of the writer was incomplete at the time of his death, and is not yet perfected. It would be out of place here, even if ready for publication; but a few words on the genus *Chiton* as restricted by Carpenter may not be superfluous.

1758.—Linné described the genus *Chiton* in the tenth edition of the *Systema Naturæ*, according four species to it, of which only one, *C. tuberculatus*, is identifiable.

1766.—S. N. ed. xii. Nine species were described by Linné, of which the first is unrecognizable and the second is *C. tuberculatus*.

1776.—Müller (Prodr. Zool. Dan.) describes several species, but selects no type.

1784.—Spengler monographs the group; his first species is *C. tuberculatus* L.

1798.—Tabl. Élém. p. 391, Cuvier gives an unrecognizable *C. punctatus* as his sole example.

1799.—Lamarck (Prodr. An. s. Vert. p. 90) gives as his sole example *C. tuberculatus* Lin.

1801.—Lamarck (Système An. s. Vert. p. 66) gives as an example *C. gigas* Chemnitz, not a Linnean species.

1815–18.—Wood (Gen. Conch. and Index Test.) gives as his first species in both cases *C. tuberculatus* L. These works antedate Lamarck's Hist. An. s. Vert.

1854.—Messrs. Adams selected, as the type of *Chiton*, *C. aculeatus* Auct., an unfortunate proceeding, since the *C. aculeatus* of Linné is unrecognizable. This arrangement was properly rejected by Dr. Gray and Dr. Carpenter.

From the rules for zoölogical nomenclature it follows that a type cannot be selected by any one for a genus proposed by any author which type was not known to and included by that author in his original list of species, if he himself omitted to specify a type.

C. tuberculatus, though described from an imperfect seven-valved specimen, is recognized by Hanley as *Chiton squamosus* of Born. It is figured by Reeve as *C. squamosus* L. var. β (Conch. Ic. pl. iv, f. 23), and in the index is called "*striatus* Barnes." It has not been generally united with the *C. squamosus* of L. (S. N. ed. xii), but is not improbably a variety of it, and belongs to the same restricted group. It comes from the West Indies. Under the circumstances, there can be no doubt that it should be considered as the type of the genus, not only because it is the only recognizable species of those orginally described, but because it was selected by Lamarck as his sole example of the genus in 1799, and served as the first species in many of the earlier works in which the Chitons were enumerated or described. The genus *Chiton* was called *Lophyrus* by Adams, from the name applied to the animal by Poli, who was a non-binomial writer. It was more correctly treated by Gray and by Dr. Carpenter in his later writings, though at one time he had, without investigation, followed the lead of Messrs. Adams.

The first authors to whom science is indebted for discriminating the different groups or genera of Chitons are chiefly Guilding, Lowe, Shuttleworth, and Gray. As all the characters were not perceived at the outset, even these writers were not perfectly consistent in their grouping, as has since become evident. But this was inevitable, and it only

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remains to rectify the disorder by the light of present knowledge, a task which may not long be delayed. If some modern authors, who have instituted wholesale changes in nomenclature, had followed a consistent and uniform plan, and not neglected or hurriedly decided on doubtful points, the work of rectification might have been much more simple, though perhaps not less urgently needed.

A few words may be added in regard to the names given by Middendorf. In spite of the opportunities afforded by his study of the Russian Chitons, this distinguished savant seemed to fail to catch the permanent as distinguished from merely individual characters, and his classification and nomenclature are not borne out by subsequent researches. His chief characters were derived from the dimensions of the soft or coriaceous girdle, dimensions which differ not only in the same species, but in the same individual, respectively, if preserved in spirit (when it may be broad) or dry (when it shrinks to a narrower compass). From this cause it is not surprising to find the same species figuring in both of his chief divisions of Chitons with exposed valves. In the attempt to utilize this impracticable classification, and unwilling to admit that the *Chitonidæ* contain more than one genus, he adopted a singular nomenclature, in which the genus was divided into a great number of sections, subsections, sub-subsections, etc., so that his work can hardly be classed as binomial in the Linnean sense. Fortunately, without exception, the groups indicated had previously been properly named by Gray, and only by courtesy can the genus *Cryptochiton*, on which his industrious research was largely expended, be assigned to him as authority, since it was denominated by the same name by Dr. Gray but a short time previously, the researches of each being unknown to the other.

To Blainville, in 1816, is due the credit of first recognizing the anomalous characters of the *Chitonidæ*, and their separation as an independent group from other gasteropods. While the value of a class in view of later researches may be held to be too high, yet few will be disposed to deny them the ordinal value assigned by Gray in 1825. The name is preferably spelled *Polyplaciphora*, though numerous other forms have been used.

The order *Polyplaciphora* can with certainty be asserted to contain but one family, so far as our present knowledge is concerned. No groups of subfamily value have yet been recognized, and it is a question whether any exist. It would be out of place here to attempt any *résumé* of the various systems of classification proposed by authors who have written on Chitons, as that proposed by Dr. Carpenter has solely been followed, and the process would occupy too much space.

Dr. Carpenter's arrangement is founded upon the plan of structure in the valves, the extent of the branchiæ, and the ornamentation or character of the girdle and its covering. He divides the *Polyplaciphora* into two great divisions:

I. REGULAR CHITONS.
Head and tail plates of similar character.

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II. IRREGULAR CHITONS.
Tail-plate with a sinus behind.

The Regular Chitons comprise—

A. *Leptoidea.*
Destitute of teeth or slit insertion-plates.

B. *Ischnoidea.*
Insertion-plates slit, sharp, thin; protected by eaves.

This contains by far the largest number of species, and might be considered typical; but the organization is not as complete in all points as in the next group.

C. *Lophyroidea.*
Insertion-plates broad, pectinated; jugular sinus broad, dentate.

D. *Acanthoidea.*
Insertion-plates sharp, grooved externally, eaves furrowed beneath, mucro posteriorly extended.

This forms a passage toward II.

The Irregular Chitons comprise—

E. *Schizoidea.*
Mantle and tail-plate both slit, behind.

F. *Placiphoroidea.*
Posterior insertion-plates only represented by a pair of swollen ribs. Mantle hairy.

G. *Mopaloidea.*
Tail-plate with one slit on each side and waved behind.

H. *Cryptoidea.*
Valves covered, or nearly so, with posterior as well as anterior sutural laminæ.

I. *Chitonelloidea.*
Tail-plate twisted into a funnel, body anteriorly extended.

Of these groups, Dr. Carpenter says: "I have purposely abstained from giving the usual terminations in *idæ* and *inæ* because I am not sure that the groups here proposed are entitled to rank even as subfamilies."

It seems to the writer that these groups are by no means of equal value, and that the Regular Chitons might well be reduced to two: Leptoids, and the remainder combined into one group; while the second section might be assorted into Schizoids (including F and G), Cryptoids, and Chitonelloids.

The opinions of Dr. Carpenter, the result of years of study, and an examination of all the principal collections of these animals in the world, are, however, not to be lightly set aside.

The Chitons of Alaska forming the principal subject of this report, together with notes on allied or extra-limital forms, are now in order. For the use of the figures illustrating this article, and many other favors and facilities for study, I am indebted to the Smithsonian Institution, in charge of Prof. S. F. Baird.

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CHITONES IRREGULARES.

MOPALOIDEA.

Genus MOPALIA Gray.

Mopalia Gray, P. Z. S. 1847, pp. 65, 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 478, 1854. (*M. Hindsii* Sby.)

Molpalia Gray, Guide, p. 184, 1857 (err. typ.).—Gould, Otia, p. 118.

Lorica regularis; laminæ longiores, suffultæ; v. ant. plurifissatâ, v. cæt. unifissatæ, ad caudam sinuatæ; sinus angustus; mucro medianus, depressus; suturæ indentatæ; zonâ latior, setosâ, interdum simplex, interdum postice fissata, interdum antice projecta; branchiæ mediæ.

Subg. *Mopalia* s. str.

Zonæ setæ irregulariter obsitæ. (*M. Hindsii* Sby.)
Sect. *a*, normales; Sect. *β*, aberrantes.

Subg. *Placiphorella* Cpr.

Zonæ setæ ad suturam fasciculatæ. (*P. velata* Cpr.)
Sect. *a*, zonâ antice dilatatâ. (*P. velata* Cpr.)
Sect. *β*, zonâ et loricâ normales. (*P. sinuata* Cpr.)

The genus *Mopalia* is the most regular in growth of all the Irregular Chitons. It is characterized by a hairy or lanugate girdle extending on or between the valves to some extent in all the species, thin insertion-plates with one slit on each side of the hind valve, which is waved inward from behind in the median line. There is generally a pronounced wave or slit in the tail end of the girdle, but this is an inconstant character even in the same species. The anterior valve has six or more slits in most cases. The typical subgenus is divided into normal and aberrant forms, the latter having the anterior portion of the girdle much produced, as in *M. Blainvillei* Brod.; both sections having the hairs irregularly distributed. In *Placiphorella* the hairs or part of them issue in fasciculi from pores at the sutures. These also are divided into two sections, the first having the anteriorly expanded girdle as in the last section of *Mopalia*, while the second resumes the normal type of shell and girdle. Many species have been described, but it becomes necessary, as will be seen, to reduce the number.

Mopalia ciliata.

Chiton ciliatus Sowerby, Conch. Ill. p. 79, 1838.—Reeve, Conch. Icon. Mon. Chiton, pl. xix, f. 124, 1847.

Mopalia ciliata H. & A. Adams, Gen. Rec. Moll. i, p. 478, 1854.

Chiton setosus Sowerby, Beechey's Voy. Zool. p. 150, pl. 41, f. 17, 1839 (not of Sow. 1832).

Chiton Colliei Reeve, Conch. Icon. Mon. Chiton, pl. xxi, f. 136, 1848.

Leptochiton Colliei H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

Chiton muscosus Gould, Proc. Boston Soc. Nat. Hist. ii, p. 145, July, 1846; Moll. Expl. Exp. p. 313, f. 436, 1852.—H. & A. Adams, Gen. Rec. Moll. i, p. 475, 1854.—Gould, Otia, p. 6, 1862.

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Mopalia ciliata.

Chætopleura muscosa Gould, Otia, p. 242, 1862.
Mopalia muscosa Carpenter, Suppl. Rep. Br. As. 1863, p. 648.
Chiton Wossnessenskii Midd. Mal. Ross. i, p. 101, 1847; in part only; figure and part of diagnosis excl.
Chiton armatus (Nutt.) Jay, Cat. 1839, No. 2678. No descr.
Chiton ornatus Nuttall, MS. Brit. Mus. Col. etc. and
Chiton consimilis Nuttall, MS. loc. cit. never described.

Subsp. **Mopalia lignosa.**

Chiton lignosus Gould, Proc. Boston Soc. Nat. Hist. ii, p. 142, July, 1846; Otia, p. 3, 1862; Exp. Sh. p. 330, f. 424, 1852.
Chætopleura lignosa Gould, Otia, p. 248, 1862.
Mopalia lignosa Carpenter, Suppl. Rep. Br. As. 1863, p. 648.
Chiton Merckii Midd. Bull. Imp. Acad. Sci. St. Petersb. t. vi, p. 20, 1846; Mal. Ross. i, p. 115, pl. xi, f. 5–6, 1847.
Chiton Eschscholtzii Midd. Bull. l. c. p. 118; Mal. Ross. l. c. p. 114, pl. xi, f. 4 (t. jun.).
Chiton (*Hamachiton, Stenosemus*) *Merckii* Midd. l. c. p. 34.
Chiton Montereyensis Cpr. P. Z. S. 1855, p. 231.
Chiton vespertinus Gould, Moll. U. S. Expl. Exp. p. 323, f. 426, 426 *a*, 1852.
Chætopleura vespertina Gould, Otia, pp. 230, 242, 1862.
Mopalia vespertina H. & A. Adams, Gen. Rec. Moll. i, p. 479, 1854.
Mopalia Simpsoni Gray, P. Z. S. 1847, p. 69.—H. & A. Adams, Gen. Rec. Moll. i, p. 479, 1854; Brit. Mus. Coll. In all cases name only; never described. (From type.)
Chiton californicus (Nutt. MS.) Reeve, Conch. Ic. Mon. Chiton, pl. xvi, f. 89, 1847.

Var. **M. Hindsii.**

Chiton Hindsii (Sowerby MS.) Reeve, Conch. Icon. Mon. Chiton, pl. xii, f. 67, *a*, *b*, 1847.
Mopalia Hindsii Gray, P. Z. S. 1847, pp. 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 478, pl. liv, f. 7, 1854.—Cpr. Suppl. Rep. Br. As. 1863, p. 213.

M. t. intus, v. posticâ ad caudam sinuatâ; v. centr. unifiss., v. ant. octofissatâ; dent. longis, suffultis, sæpe extus rugosis; subgrundis minimis spongiosis; sinu minimo, acuto, lam. sutur. ab apice antico solum separatis; zonâ setiferâ seu lanuginosâ; valvis parum postice, antice valde apicata; zonâ postice haud seu varius fissatâ.

Lon. 25–60, Lat. 15–40 mm. Div. 140°.

Hab.—Shumagin Islands (rare) to California; Dall! between tide-marks and at lowest water. Many specimens (hundreds) examined.

Typical form: sculpture variable, but strong; girdle thickly set with tubular hairs, varying from long, strong bristles to fine, soft pilæ. The best distinguishing features are brown or blackish olive color outside; inside, bluish green and lilac; jugular and caudal sinuses narrow, the latter often not visible externally.

Subsp. *lignosa:* sculpture faint; inside greenish; sinus variable; hairs of the girdle variable, but always softer and shorter than in well-marked *ciliata*, often hardly perceptible in dry specimens; external colors grayish or greenish, with streaks and flammules of brown and white.

Var. *Hindsii:* exterior uniform, smoothish; sculpture evanescent; color outside, light olive to nearly black; inside, whitish, carmine in the me-

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dian line; tail notched in the young, but not in the adult; tail-sinus visible outside; girdle with few and short hairs.

This species can be distinguished from all varieties of *Wossnessenskii* by its blackish and proportionately much narrower girdle, and by a sort of prolongation of the external layer of the shell forward under the apex of the next anterior valve in the median line, forming a sort of anterior false apex, which is hidden until the valves are separated. In *Wossnessenskii* this part is squared off, the girdle is yellowish (when alive), and the valves are much less transverse.

It will be surprising if those who have only observed these animals by a few dry specimens in collections are willing to accept the synonymy above given. I confess that not long since I would have been unwilling to believe that the rough, bristly, typical *muscosa* and the dark, smooth *Hindsii* could be properly combined under one name with each other or with the finely reticulated and painted *lignosa*. But the study of a large multitude of specimens has convinced me no arbitrary line can be drawn anywhere in a fully representative series, beginning with coarsest *ciliata* and ending with a practically smooth *Hindsii*. The characters of girdle, sculpture, and form are not only variable in themselves, but are found variably combined, except that it is rarer to find coarsest sculpture with a downy than with a bristly girdle. However, even this occurs. On the other hand, out of such a series a dozen forms might be selected which, if only the characters were constant, every one would acknowledge as good species.

In his description of *Wossnessenskii*, Middendorf, according to Dr. Carpenter, had both species under his observation, and did not observe it. His figures, however, belong solely to the following species. Sowerby's *setosus*, in the Zoology of the Blossom's Voyage, is not his species so named in 1832, and the former was renamed *Colliei*, by Reeve, in the Conch. Iconica. The sculpture figured by Sowerby was not characteristic; Reeve's figure is better. From an examination of the type, Dr. Carpenter became convinced that the undescribed *M. Simpsoni* Gray was identical with *lignosa*. There is very little doubt that Middendorf's *Chiton Eschscholtzii* was merely a young *ciliata*. Dr. Gould's original types have been consulted during the preparation of this description.

Mopalia Wossnessenskii.

Chiton Wossnessenskii Midd. Bull. Imp. Acad. Sci. St. Petersb. t. vi, p. 119, 1847 (pars); Mal. Ross. i, p. 101 (diagn. maj. pars), pl. xi, f. 1-2, 1847.

Chiton (*Hamachiton, Platysemus*) *Wossnessenskii* Midd. Mal. Ross. l. c. p. 34, 1847.

Chiton coelatus Reeve, Conch. Icon. Mon. Chiton, pl. xvii, f. 101, 1847 (loc. err.).—H. & A. Adams, Gen. Rec. Moll. i, p. 475, 1854.

Mopalia Kennerleyi Carpenter, Suppl. Rep. Br. Assoc. 1853, p. 648; Proc. Phil. Acad. Nat. Sci. April, 1865, p. 59.

Mopalia Grayi Carpenter, Suppl. Rep. l. c. p. 603, name only.

M. Kennerleyi var. *Swanii* Cpr. Suppl. Rep. l. c. p. 648, 1853.

M. t. valvis haud antice apicatis; v. post. extus valde sinuatâ; intus v. post. late ad caudam sinuatâ, et v. centr. 1-, v. ant. 8- (rarius 9-, 10-)

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fiss.; sinu latiore; zonâ postice fissatâ, setis tenuioribus, planatis, pallidis, minus confertim obsitâ. Lon. 50, Lat. 25 mm.

Var. *Swanii:* t. omnino rufâ, sculpturâ tenuiore.

Hab.—Unalashka, Aleutian Islands (rare and small) to Sitka, and southeastward to Monterey, California; from low water to twenty fathoms, adhering to solid objects, stones, and shells! Two hundred and fifty-four specimens examined.

This species may be recognized by its broad, yellowish, downy girdle, when fresh, often encroaching far into the sutures; by the absence of false apices, such as are found in *ciliata;* by its color, in which vermillion and verdigris green are beautifully mingled (except in the var. *Swanii*, which is pure red); and by the softness of the flattened and less crowded hairs. The girdle-fissure is not constant, though usual. It is nearly white inside; the sinus is broader and the valves, as a whole, longer in an axial direction, making them less transverse than in *ciliata.* It is one of the most beautiful of all Chitons, when closely examined.

An examination of the soft parts afforded the following notes on this species:

The "fringe," or true mantle-edge, is entire, extending around the whole body within the edge of the girdle, and slightly notched at the posterior sinus of the girdle. Veil short in front and broad at the sides, ending behind in two broad, squarish lappets, the edge crenulate throughout. Anus median, distinct. Ovary single, tortuous, overlying the viscera, with no distinct oviduct, so far as could be observed. In texture, the ovary resembles that of *Acmæa.* If there be an oviduct, it passes from the under side of the sac, one-third of the way forward from the posterior end of the ovary. Behind the ovary are two "slime glands" (Midd.), one on each side, opening outward by a plain opening in a fold of the integument, one on each side between the branchiæ and the anus. They are not present in all Chitons. Schiff did not find them in *C. piceus.* Gills about thirty-eight in number on each side, extending forward about two-thirds the length of the foot.

Extra-limital Species.

Subgenus PLACIPHORELLA Cpr.

Placiphorella sinuata.

Mopalia sinuata Cpr. Proc. Acad. Nat. Sci. Philad. 1865, p. 59.

P. t. lam. sutur. planatis, ab apice antico-externo separatis, sinu angustissimo; dent. valde suffultis.

Hab.—Puget Sound and San Francisco Bay, Cal.

Placiphorella imporcata.

Mopalia imporcata Carpenter, l. c. p. 59, 1865.

P. t. lam. sutur. et apice antico ut in *P. sinuatâ*, sinu paullo minus angusta; dent. parum suffultis; v. ant. octofissatâ.

Hab.—Puget Sound; Santa Barbara Ids., Cal.

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These species are known to me only by the types; they may extend their range into the Alexander Archipelago.

In *Placiphorella velata* Cpr., type of the subgenus, the gill-rows are as long as the foot, branchiæ about twenty-five in number, widely separated behind. Mantle-edge behind narrow and plain; in front produced and fringed with long fleshy processes. No oviduct could be traced, though the ovary was crowded with eggs, some of which were 0.25 mm. in length. In them the embryo could be plainly distinguished. There were no furrows for the shelly plates, but the eyes were quite prominent and the cephalic lobe comprised nearly half the animal. There were no bands of cilia, but the edge of the cephalic lobe was strongly ciliated.

CRYPTOIDEA.

Genus AMICULA Gray.

Gray, Syn. Brit. Mus. 1840, also ed. 1842 (no description); P. Z. S. 1847, pp. 65, 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 480, pl. 55, f. 2, 1854.—Gray, Guide, p. 187, 1857.

Type *Chiton vestitus* Sowerby.

Corpus regulare; loricâ expositâ parvâ, mucronatâ, seu subcordatâ; laminæ insertionis mopaloideæ, lam. sut. post. magnæ; zonâ plus minusve pilosâ, interdum poriferâ.

Subgenus *Amicula* s. str. (Gray).
Branchiæ mediæ. *A. vestita* Sowerby.

Subgenus *Chlamydochiton* (Dall).
Branchiæ ambientes. *C. amiculata* Pallas.

Both groups are provided with pores bearing fasciculi of bristles of a soft or horny character, and which, while often irregularly disposed or even almost entirely absent (in particular individuals), have a tendency to arrange themselves in two rows on each side of the median line, one row behind the exposed point of the valve and another near its submerged lateral posterior angle, on each side. The mantle is also provided with a coating of fine, chaffy, deciduous scales.

Subgenus AMICULA (Gray) Dall.

Amicula Gray, l. c. 1847. (*C. vestitus* Sow.)

Symmetrogephyrus Middendorf, Mal. Ross. i, p. 98, 1847. (*C. Pallasii* Midd.)—Chenu, Man. i, 383, 1859.

Stimpsoniella Carpenter, Bull. Essex Inst. v, p. 155, 1873. (*C. Pallasii* Midd. and *Emersonii* Couth.)

Middendorfia Carpenter, MS. 1871.

Amicula vestita.

Chiton vestitus Sowerby, Zool. Journ. iv, p. 368, 1829; Conch. Ill. f. 128, 128*a* (from type-specimen), 1839; Zool. Beechey's Voy. p. 150, pl. xli, f. 14, 1839.

? *C. amiculatus* Wood, Ind. Test. pl. 1, f. 12, 1828 (probably).—Reeve, Conch. Icon. Mon. Chiton, pl. xi, f. 59, 1847.

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Amicula vestita.

Amicula vestita Gray, P. Z. S. 1847, pp. 65, 69, 169.—H. & A. Adams, Gen. Rec. Moll. i, p. 480, pl. 55, f. 2, 1854.—Gray, Guide, p. 187, 1857.
Amicula vestita Cpr. Bull. Essex Inst. 1873, p. 155.

(? *Var.* **Emersonii.**)

Chiton Emersonii Couthouy, Bost. Journ. Nat. Hist. ii, p. 83, pl. iii, f. 10, 1838.
Chiton Emersonianus Gould, Inv. Mass. p. 151, f. 19, 1841.—Reeve, Conch. Icon. Mon. Chiton, pl. xi, f. 59, 1847.
Amicula Emersonii Gray, P. Z. S. 1847, p. 69.—H. & A. Adams, Gen. Rec. Moll. i, p. 481, 1854.—Gray, Guide, p. 185, 1857.—Stimpson, Smithsonian Checklist of East Coast Shells, 1860.—Binney's Gould, p. 264, f. 527 (bad), 1870.
Amicula vestita Stimpson, Shells of N. Engl. p. 29, 1851.
Stimpsoniella Emersonii Cpr. Bull. Essex Inst. 1873, p. 155.

A. t. valvarum parte expositâ (huic generi) majore, latâ, subreniforme, antice acutâ sed haud prolongatâ, lateribus rectangulatis, postice bilobatis, sinu latiore; ar. jug. centr. et lat. haud definitis; totâ superficie granulosâ, supra jugum læviori; circa marginem undique (nisi ad mucronem in sinu postico) bicostatâ; intus, v. post. typice mopaloideo, utr. lat. unifissatâ, sinu caudali lato, breviore; v. centr. 1-, ant. 6-fiss.; laminis acutis, fissuris parvis, sulcis ex fissuris haud loricam tenus continuis; lam. sut. ant. haud separatis, sinu lato, brevi; post. minoribus sed à sinu postico alto latiore omnino separatis; (*Cpr.*) Zonâ tenui, læviore; setulis furfuraceis et fasciculis setarum plus minusve irregularis suprâ zonam expositâ. Lon. 50, Lat. 35 mm.

Hab.—Arctic Ocean, extending southward in the Pacific region to Hagmeister and St. Paul Islands, Bering Sea; on the Atlantic south on the New England coast to Cape Cod; in 5–30 fathoms, mud and stones. Two young specimens, not certainly of this species, in 60 fathoms, Captain's Bay, Unalashka. Thirteen specimens examined.

The "ovarian" openings, bilaterally symmetrical, are situated just behind and, as it were, under the shadow of the posterior branchia on each side. They are not simple orifices, but fenestræ, compsoed of two openings somewhat oblique and linear; the anterior a little nearer the girdle and a little larger than the posterior one.

I have no doubt whatever that the original *vestitus* of Sowerby (from Beechey's original locality I have examples) is identical with the *Emersonii* of Couthouy.

Much has been said about the presence or absence of 'pores' and hair-tufts. I find from examination of a series that the young *Emersonii* is usually smooth, the large ones always setiferous. These setæ are, as described by Dr. Gould, in two rows on each side, or rather six in all if we count the pretty constant tufts behind the exposed apices of the shell. These rows are (1) two behind the shell points as above; (2) two, one on each side at the posterior angle of the submerged expansion of the valve; (3) a series, more or less irregular, along the margin of the girdle. Beside this, in old ones, there are irregular tufts all over the girdle, and some of the regular tufts *may* be missing.

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Dr. Carpenter, seeing young specimens, could not recognize the pore-tufts of Gould. Shortly before his death, however, he sent me specimens which showed them plainly; it is evidently a character in this group of very little importance.

As regards its identity with *vestita;* when dry, the New England form precisely resembles the figures from Sowerby's type-specimen in his Conchological Illustrations, taken from a dried specimen. He considered *Emersonii* a synonym, and I fully agree with him, but have kept the two separated in the foregoing synonymy for the convenience of those who may doubt this.

This species is very close to *A. Pallasii*, but is distinguishable by the larger and laterally much more expanded exposed portions of the valves, by its flatter form, and proportionally sparser and longer setæ. When dry, the whole form of the valves is visible in *vestita* from above, like the bones of a Peruvian mummy; in *Pallasii*, however, the integument is so much more coriaceous and thick, that in dry specimens hardly anything of these outlines is visible. Middendorf's figure, copied by Chenu, well represents *A. Pallasii* when fresh. In cabinets it is rare, and is not common in the field where collectors have searched for it.

Amicula Pallasii.

Chiton Pallasii Midd. Bull. Acad. Sci. St. Petersb. vi, p. 117, 1847.

Chiton (subg. *Phænochiton*, sect. *Dichachiton*, subs. *Symmetrogephyrus*) *Pallasii* Midd. Mal. Ross. i, p. 98, 1847; Sib. Reise, p. 163, t. xiii, f. 1–9; t. xiv, f. 1–6, 1851.

Amicula Pallasii H. & A. Ad. Gen. i, p. 481, 1854.—Chenu, i, p. 383, 1859.

Stimpsoniella Pallasii Cpr. Bull. Essex Inst. 1873, p. 155.

A. t. valvarum mucrone cordiformi solum externe conspicuâ; intus v. post. mopaloideâ, utr. lat. unifissatâ, sinu caudali minore, laminâ posticâ extus rugosâ lato, brevi; v. centr. 1-, v. ant. 6–8-fissatis; lam. acutis ex fissuris umbonem tenus sulcatis; lam. sutur. ant. modicis haud separatis, sinu lato brevi; post. latis, regulariter arcuatis, à sinu postico lato alto separatis, (*Cpr.*) Limbus (zonâ) luxurians in pallium extenditur, totum animalis dorsum rotundatum obtegens, valvas obvolvens et occultans, solis octo aperturis minutis, rotundatis, in linea mediana, quibus aditus ad umbonem valvarum patet; color squalido lutescens; epidermis dorsalis undique versum fasciculis pilorum crinitâ. Lon. 67, Lat. 48, Alt. 21 mm. Div. 120°.

Hab.—Okhotsk Sea, Midd.; Pribiloff, Aleutian, and Shumagin Islands, Dall! 3 to 10 fathoms, very rare. Seven specimens examined.

The rounded back, tough and hairy girdle with minute holes for the tips of the valves, the valves themselves less transverse as a whole and much less exposed than in *vestita*, are the characters by which this species may be readily distinguished from the latter. My specimens have only six fissures in the anterior valve against eight in a specimen of *vestita* of the same size.

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It is even rarer than the last species, and hardly known in collections.

The gills are median; mantle-edge broad and even; the veil is pectinated and the anterior edge of the muzzle has a sort of rim or margin, besides.

Subgenus CHLAMYDOCHITON Dall.

Amicula Cpr. pars; non Gray, Adams, etc.
Chlamydochiton Dall, Proc. Nat. Mus. p. 1, Jan. 1878.

Chlamydochiton amiculatus.

Chlamydochiton amiculatus Dall, l. c.

Chiton amiculatus Pallas, Nova Acta Petrop. ii, p. 241, pl. vii, f. 26-30, 1788.—Gmelin, Syst. Nat. p. 3206, 1790.—Wood, Gen. Conch. p. 13, 1815.—Dillwyn, Cat. Rec. Shells, i, p. 6, 1817.—Blainville, Dict. Sci. Nat. xxxvi, p. 546, 1825.—Midd. Mal. Ross. i, p. 96, 1847.—H. & A. Adams, Gen. Rec. Moll. i, p. 480, 1854.

Not *C. amiculatus* Sowerby, Conch. Ill. f. 80, 1839, nor of Gray, P. Z. S. 1847, pp. 65, 69, 169, = *C. Stelleri* Midd.

Not *C. amiculatus* Wood, Ind. Test. f. 12, 1828, = *C. vestitus* (probably).—? Reeve, Conch. Icon. Chiton, f. 59, 1847.

C. t. extus Cr. Stelleri, jun. simili, sed apicibus valvarum rotundatis extantibus; intus, laminis v. post. mopaloideis, utr. lat. (et v. centr.) unifissatis; sinu caudali lato, altiore; lam. sut. anticis modicis junctis, sinu lato; posticis majoribus, regulariter arcuatis, extus haud sinuatis, postice sinu lato, alto, subapicem planato, haud laminato; fissuris usque ad apices sulcatis; zonâ coriaceâ, læviore poris seriebus 2 circa suturas et marginem, majoribus; seriebus inter valvas et irregulariter supra zonam sparsis, minoribus; setis porarum paucis, longioribus, haud spiculosis. Lon. 75, Lat. 40 mm. (*Cpr.*)

Hab.—"Japan," London dealer; Kuril Islands, Pallas and Steller; Farallones Islands, California, Newcomb! Two specimens examined.

This species probably has about the same distribution as *C. Stelleri*, though much rarer, and may by collectors have been taken for an imperfect or immature specimen of that mollusk; when dry, to a casual glance they appear very similar, the minute apices of the valves being hardly visible. The coating of the girdle is, however, of a wholly different character. Dr. Carpenter would have reserved the name *Amicula* Gray for this species, but that name cannot legitimately be separated from its typical species (*vestita*), which belongs in the other subgenus. The ambient gills are the only sound character. The pores, which gave Dr. Carpenter a great deal of unnecessary trouble, are in this group not even of specific importance. I have only seen specimens in Dr. Carpenter's hands, and insert his description of the characters. It is doubtless one of the very rarest of the Chitons. Its nearest allies are *A. Pallasii* and *vestita*.

The figures given by Pallas are sufficient to identify the species very well, but in his remarks he quotes notes by Steller, which refer to the

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great *Cryptochiton Stelleri* of modern authors. Some specimens of *Stelleri* in the Berlin Museum are marked *amiculatus* on very ancient labels, so there can be little doubt that the two species were confounded by the earlier authors.

Genus CRYPTOCHITON Midd. and Gray.

Midd. Mal. Ross. i, pp. 1–96, pl. 1–9, 1847. Type *C. stelleri* Midd.—Gray, P. Z. S. 1847, pp. 65, 69, 169; Guide, p. 185, 1857.

Valvæ omnino in zonâ immersæ; laminæ insertionis rude mopaloideæ; lam. sutur. tam postice quam antice junctæ, postice trisinuatæ; zonâ minutissime fasciculatim pilosâ; branchiæ ambientes.

This genus was simultaneously described under the same name by Gray and Middendorf, apparently without knowledge of each other's labors, and both having the same species in view, though Gray erroneously supposed his type to be the *C. amiculatus* of Pallas, and called it by that name; his diagnosis and synonymy, however, showing that he really referred to *C. Stelleri*.

It appears probable, from some of Pallas' specimens examined by me in the Berlin Museum, that he included this species with the *amiculatus* in his distribution, and, in fact, unless carefully examined, almost any one might do the same.

Cryptochiton Stelleri.

Chiton Stelleri Midd. Bull. Acad. Sci. St. Pétersb. vi, p. 116, 1846.

Chiton (*Cryptochiton*) *Stelleri* Midd. Mal. Ross. i, p. 93, t. i–ix, 1847; Mém. de l'Acad. Imp. Sci. St. Pétersb. 6me sér. vi, p. 101, 157, 1849.—Schrenck, Amur-Land Moll. p. 271, 1867.

Chiton amiculatus Sowerby (not Pallas), Conch. Ill. f. 80, 80 bis, 1839.—Gray, P. Z. S. 1847, pp. 65, 69, 169.

Chiton sitkensis Reeve, Conch. Icon. Chiton, pl. x, f. 55, 55 *b*, 1847. (Not *C. sitkensis* Midd.)

Chiton chlamys Reeve, l. c. pl. xi, f. 60, 1847 (from type, Cpr.).

Cryptochiton Stelleri Gray, Guide, p. 185, 1857.—H. & A. Adams, Gen. Rec. Moll. i, p. 479, iii, pl. iv, f. 1, 1 *a*, 1854.—Carpenter, Suppl. Rep. Brit. As. 1863, p. 648.

(*Patellæ longæ Rondeletii* auf Kurilisch Kéru, Steller, Beschreib. Kamtsch. p. 177, 1774.)

C. t. intus; v. post. mopaloideâ, mucrone obtuso ad posticam trientem; sinu caudali alto, lato; fissuris utr. lat. unâ, subposticis, conspicuis; lam. sut. anticis latioribus, junctis, sinu jugali alto, modico, subplanato; v. ant. mucrone ad quartam partem posticam, normaliter utr. lat. 1- et ant. 3- (id est omnino 5-, sed interdum 4–6-, seu 7-) fissatâ; lam. sut. posticis longis, lateraliter conspicue sinuatis, medio junctis, sinu postico altissimo, pyramidali, frustrato; v. centr. mucr. ad quintam partem posticam; haud seu interdum 1-fiss.; lam. lat. et sutur. ant. haud separatis, sinu jugali angustiore, altissimo, irregulariter arcuato,

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haud planato; lam. post. super-suturalibus minoribus, longis, à sinibus marginalibus conspicue separatis; sinu postico altissimo, irregulariter gothico, lam. junctis; valvis omnibus mucronatis, mucrone seu umbilicoideo seu punctato seu pustuloso; zonâ omnino fasciculis minutis spicularum minimarum irregulariter conferte instructâ. (*Cpr.*) Lon. 200, Lat. 75 mm. Div. 130°.

Hab.—Japan Sea; Sakalin Id.; Kuril Ids.; Kamchatka (southern extreme); the Aleutian Islands and the whole coast southward to Monterey and the Santa Barbara Islands, California. Usually found just below tide-marks, and often cast up on the beach in great numbers by severe gales. Collected abundantly at Unalashka and Sitka, also at Monterey; Dall!

This the largest and in many other respects the most remarkable of all Chitons is readily recognized by its wholly covered valves, no indication of which is evident, even under the skin, in fresh examples. It is covered with cells, each holding a fascicle of small spines, which, when dry, have an urticating effect upon the skin of those who may handle them. The foot and softer parts are used as food by the Aleuts and Indians; they are eaten in the raw state. The back is of a fine ferruginous red when fresh; dried specimens are usually more or less distorted and mauled; one of those figured by Reeve appears to have been partly rotten.

There is a good deal of variation in the size and relative proportions of the valves in different individuals, and the fissures are sometimes partly abortive or abnormally multiplied.

The soft parts of this species have formed the subject of an extensive monograph by Dr. Middendorf in his first part of the Beitr. Mal. Rossica. To that work the student is referred for details.

Genus KATHERINA Gray.

Katherina Gray, P. Z. S. 1847, p. 65. Type *K. tunicata* Wood.

Lorica parva; zonâ lævis, in suturas valde expansâ; laminæ valde antice projectæ, v. post. sæpe lobatæ; sinus altissimus, spongiosus; branchiæ ambientes.

This is an aberrant genus. In the smallness of the exposed portion and smoothness of the girdle it resembles *Phacellopleura;* in the extreme anterior projection of the plates, and in the deep spongy sinus, it is most like *Nuttallina*, of which it might be regarded as an exaggeration with a smooth girdle; but the tail-plate has most affinity with the *Mopaloidea.* Specimens may be found with many lobes like *Phacellopleura;* but on comparison of many individuals it will be found that the normal arrangement is a mopaloid slit on each side, with an angular sinus at the tail, and that the extra slits are extremely irregular and secondary. In *Nuttallina*, the plan, on the contrary, is perfectly regular, and *Phacello-*

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pleura appears to be of the regular type. Middendorf's figures of the plates are inaccurate, and Gray's description in the Guide differs from his more correct account in the Proc. Zool. Soc. (Cpr. MS.).

In the sole species of this genus, the ovary is convoluted and single. The ovarian openings are found on each side between the line of the branchiæ and the side of the foot. They are placed in the vicinity of the fifth branchia from the posterior end of the row. There are no slime glands. The organ of Bojanus appeared to be represented by a glandular deposit on the floor of the visceral cavity behind. The muzzle is plain, drawn down to corners behind on each side, but without flaps. Veil narrow, thin, plain, produced in a flap on each side of the muzzle. Mantle-edge narrow, plain. Branchiæ about sixty on a side in a row as long as the foot. Anus papillate, median, with a ridge extending each way from it. Soft parts yellowish to deep orange, girdle shining blue black.

Katherina tunicata.

Chiton tunicatus Wood, Gen. Conch. p. 11, fol. 2, f. 1, 1815; Ind. Test. Chiton, pl. 1, f. 10, 1828; Ib. ed. Hanl. 1856.—Sowerby, Beechey's Voy. Zool. p. 150, t. xli, f. 15, 1839.—Reeve, Conch. Icon. Mon. Chiton, f. 61 (good), 1847.

Chiton (*Phœnochiton, Hamachiton, Platysemus*) *tunicatus* Midd.—Mal. Ross. i, p. 98, t. x, f. 1–2, 1847.

Katherina tunicata Gray, P. Z. S. 1847, p. 69; Ib. Guide, p. 185, 1857.—Cpr. Suppl. Rep. Br. As. 1863, p. 648.

Katherina Douglasiæ Gray, P. Z. S. 1847, p. 69.

Katherina tunicata H. & A. Adams, Gen. Rec. Moll. i, p. 479, iii, pl. 54, f. 8, 1854.

K. t. extus, valvis postice fere rectangulatis; areâ jugali longissimâ, antice inter lam. sutur. projectâ, tenuissime punctulata; area centr. rotundatis, quincuncialiter fortiore punctatâ; ar. lat. haud definitis, fere obsoletis; mucrone subpostice mediano, elevato; intus, v. post. laminis ad caudam angulatim sinuatis, præcipue utr. lat. unifissatis, sed interdum in lobas irregulares ½, ⅓, ⅔, ¾, ¼ fiss.; v. centr. 1-, ant. 7-fissatis; laminis prælongis, antice valde projectis, acutis, extus striatis, fissuris parvis, suffultis, ad subgrundas solidas, curtissimas valde spongiosas, sulcis continuis; sinu altissimo, angusto, spongioso; lam. sutur. separatis, prælongis; zonâ nigrâ, supra valvis tenui, omnino lævi. Lon. 50, Lat. 20 mm.

Hab.—Kamchatka (Cpr.); the entire Aleutian group; on the north side of the peninsula of Aliaska to Port Möller, and on the south side east to Cook's Inlet, and south to Catalina Island, California; low water (chiefly), to 20 fathoms. Several hundred specimens examined.

This unmistakable shell, characterized, when fresh, by its broad shining black girdle and almost covered valves, is eaten raw by the natives of the northwest coast, and is said to act as an aphrodisiac. The supposed second species of Gray is merely a result of an irregular drying of the girdle. The soft parts are of a salmon color in northern speci-

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mens. The less important details are very variable in different individuals.

In taking leave of the Irregular Chitons, a few notes on exotic species of this section may be properly incorporated.

In *Chitonellus fasciatus*, the representative of the most highly developed type of Chiton, the gill-rows are confined to the posterior quarter of the foot, but the separate branchiæ of which they are composed are very large, twenty-six or eight in number, and rather long. There was no well-marked crop, as in ordinary Chitons. The muzzle was inconspicuous, angulated at the posterior corners, with no veil. Mantle hardly visible. There seemed to be two oviducts leading from a single ovary (compounded of two?) to small orifices, one on each side of the anus.

In *Cryptoconchus monticularis* Quoy, which much recalls the northern *Katherina*, the girdle varied from black to light brown. A veil was present, but narrow and simple, while the mantle-edge was hardly perceptible. Gill-rows one-third as long as the foot, containing each about eighteen branchiæ. Muzzle very transverse, with flaps at the posterior corners. Ovisac single.

CHITONES REGULARES.

LEPTOIDEA.

Genus LEPTOCHITON Gray.

Leptochiton Gray, P. Z. S. 1847, p. 127; Guide, p. 182, 1857.
< *Leptochiton* H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.—Chenu, Man. Conchyl. i, p. 381, 1859, etc.
< *Lepidopleurus* Risso (ex Leach MS.), 1826.—Sars, Moll. Reg. Arct. Norvegiæ, p. 110, 1878.

Lam. insertionis nullis; zonâ minutissime sabulosâ; sinus lævis; haud laminatus; branchiæ breves. Type *L. asellus* Lowe.

The diagnosis of Gray determines the genus, but he includes in the examples cited *C. albus* L., which is a *Trachydermon*. Two out of twenty-five species cited by the brothers Adams are real Leptochitons; the example cited by them as typical is not a *Leptochiton*, neither is the example cited by Chenu. The other Leptoid genera are as follows:

Hanleyia Gray, Guide, p. 186, 1857.

Anterior valve with an unslit insertion-plate; other valves without even the plates. *H. debilis* Gray.

Hemiarthrum Carpenter, Bull. U. S. Nat. Mus. iii, p. 44, 1876.

Insertion-plates present on all the valves, but entire without slits. *H. setulosum* Cpr. l. c.

Deshayesiella Carpenter MS.

Loricâ elongatâ; valvæ curvatæ, antice tendentes; mucro planatus, zonâ spiculosâ; lam. insert. nullis; lam. sut. triangulares, extantibus. *D.* (*Leptochiton*) *curvatus* Cpr.

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Microplax H. Adams.

Resembling *Chitonellus* externally; submerged laminæ unslit, entire, fused in an undistinguishable manner with the parts which usually constitute the sutural laminæ. *M. Grayi* Ad. & Ang.

The paleozoic *Helminthochiton* Salter, *Priscochiton* Billings, *Gryphochiton* Gray, and several unpublished names of Dr. Carpenter, all belong to the Leptoidea. A large number of the fossils described as Chitons (for instance *Sulcochiton Grayi* Ryckholt) are not mollusks; many of them being valves of *Balani* or fragments of isopod crustaceans.

Leptochiton cancellatus.

Chiton cancellatus Sowerby (as ? of Leach MS.), Conch. Ill. f. 104–5, 1839.
Chiton albus Pulteney, non Lin. fide Hanley.
Chiton cancellatus Reeve, Conch. Ic. pl. lix, f. 152, 1847.
Chiton asellus Midd. Mal. Ross. i, p. 122, 1847, not of Lowe.
Chiton cancellatus Forbes & Hanley, Brit. Moll. ii, p. 410, pl. lix, f. 3, 1853 (outlines inverted in figure).
Leptochiton cancellatus H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.
Chiton cancellatus Jeffreys, Brit. Conch. iii, p. 217, 1865; v, p. 198, pl. lvi, f. 1, 1869.
Chiton alveolus Jeffreys, l. c. iii, p. 218, 1865; not of Sars.
Chiton Risoi auct. not of Payraudeau.
Lepidopleurus cancellatus Sars, Moll. Reg. Arc. Norv. p. 111, t. 7, f. 6 *a–k*, 1878, dentition t. I. f. 8, (imperfect).
? *Lepidopleurus arcticus* Sars, l. c. p. 112, t. 7, f. 7 *a–k*.
? = *Chiton islandicus* Gmelin, S. N. 3206, 1788.—Schröter, Einl. iii, p. 509.—Dillwyn, Rec. Shells, i, p. 10, 1817.

L. t. minimâ, elongata, valde elevatâ, regulariter arcuatâ; jugo nullo; aurantiâ plus minusve cinereo tinctâ, interdum albidâ; valvis angustioribus, haud rectangulatis, apicibus nullis; mucrone centrali, valde elevato, sculpturâ ut in *L. asello*, sed granulis parum majoribus; areis centr. parum divergentibus, areis lat. satis definitis, vix elevatis; *intus*, laminis sut. minimis, triangularibus; sinu latissimo, marginibusque valvarum à sculpturâ externâ paullulum crenulatis; *zonâ*, angustâ, squamuliis tenuibus, haud imbricatis, haud striulatis, dense obsitâ. Lon. 6, Lat. 3 mm. Div. 80°.

Hab.—British seas; Norwegian coast in 50–100 fms.; Greenland; Gulf of Lyons (Jeffr.); Lofoten, 300 fms. (Sars); Vigo, Spain (McAndrew); Dalmatia (Brusina); Alaska, at Unalashka, Shumagins, Port Etches, and Sitka Harbor, 6–100 fms. Dall! Ninety-four specimens examined.

This species without careful inspection will usually be confounded with small specimens of *Trachydermon albus*, but a glance at the sculpture is sufficient to separate it. From several other species of *Leptochiton* it is less readily distinguished, and a magnifier is indispensable. The differential characters are as follows:

The pustules which constitute most of the sculpture are arranged like overlapping coins or a solid-linked chain in lines which in the dor-

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sal area are nearly parallel with the longitudinal axis of the animal. The lateral areas are distinct, and the pustules upon them are arranged in rather indistinct lines radiating toward the lateral ends of the valves, at nearly right angles to the lines on the dorsal area. The sculpture on the mucro is more delicate than elsewhere. The apex of the posterior valve is not sunken, and is not so sharp as in other species compared with it here; the girdle is scaly, with also some small spinose transparent scales near the margin. There are five gill-plumes on each side, prominent and near the vent. There appear to be two fenestræ on each side. The lateral areas and other portions of the valves are nearly always colored with blackish or ferruginous patches, but these, as with *Trachydermon albus*, seem to be really composed of extraneous matter.

In *L. fuliginatus* Ad. & Rve., the pustules are much smaller, and while having a general longitudinal arrangement on the dorsum, do not form regularly defined rows or chains. The areas are not raised above the dorsum. The shell is much larger and more elevated, with a somewhat sunken and quite sharp posterior mucro. The other mucrones are not raised, but about them the sculpture is more regularly aligned than elsewhere. I have compared the valves of a typical specimen from Korea collected by Belcher. Reeve's figure of the sculpture is very bad, as are most of his details. *L. alveolus* Sars is a very distinct species, though it has been confounded with this. Its sculpture is composed of larger and rather more sparse, isolated pustules, absolutely irregular in distribution and of the same size on the mucro and elsewhere. Nowhere do they form lines. The arch of the back is peculiarly round, the lateral areas not raised and barely distinguishable. The girdle seems similar. I have compared typical examples.

L. concinnus Gould, from the types, is of a different color, and has a much stronger and different sculpture, like lines of rope.

L. internexus Carpenter and var. *rugatus* Cpr. are more like *concinnus*, but distinguished from either by the peculiar girdle covered with subequal scales.

L. nexus Carpenter more nearly resembles *cancellatus*, but the sculpture is of separate, not lapping, rounded-rhomboidal pustules; the mucrones are much more pronounced, and the white ground is prettily marbled with black and gray inherent coloration.

The name *cancellatus* is a misnomer, since it is only in certain lights that any trace of reticulation can be observed faintly. The young are flatter than the adults. It bears no resemblance to *L. asellus*, with which Middendorf united it, probably without a comparison.

L. arcticus of Sars seems to be a finely grown variety of this species, if one may judge from the figures; at least no differential characters are given which seem to be of a permanent character, and not subject to variation within the limits of a species.

The specimens of this species obtained by me in Alaska were at first referred to *fuliginatus* by Dr. Carpenter, and some specimens were distributed under that name, or the name of *fuliginosus*, before I had the

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opportunity of making the correction, which, had Dr. Carpenter survived to finish his work, he would undoubtedly have done himself.

In the hurry of field-work, the specimens were confounded with young *T. albus*, and hence no observations on the living animal were made. Had attention been drawn to it, it might, doubtless, have been obtained throughout the Aleutian chain, but no specimens occurred in the collections from more northern localities. Jeffreys states that the under edge of the girdle and the soft parts are yellowish white, tinged with flesh color; also that littoral specimens from Herm are larger than those found in deeper water. In Alaska it has been obtained only with the dredge.

The gills occupy a space corresponding to the posterior quarter of the foot; there are about eight or ten on each side. The mantle-edge is plain and thick. The veil is plain. The muzzle is rounded, with a little papilla at the posterior corner on each side.

Leptochiton alveolus.

Leptochiton alveolus (Sars MS.) Lovén, Ind. Moll. Lit. Scand. p. 27, 1846. Not of Jeffreys, etc.

Lepidopleurus alveolus G. O. Sars, Moll. Reg. Arc. Nor. p. 110, t. 7, f. 3 *a–i*; t. I, f. 7 (good), 1878.

Hab.—Bergen, Lofoten, Finmark, 150–300 f. (Sars); Gulf of St. Lawrence, in 220 fathoms, between Cape Rosier and the S. W. point of Anticosti Island, Whiteaves! St. George's Bank, Gulf of Maine, 150 fathoms, U. S. Fish Com., 1872!

This extra-limital species is inserted here because of its possible relations with the next species, and also to call attention to the addition to our Northeast American fauna made by Mr. Whiteaves. It is a remarkably distinct species, and if typical examples had been examined by the authors who have referred it to *L. cancellatus*, it would seem unlikely that it would have been so referred.

Leptochiton Belknapi.

Leptochiton Belknapi Dall, Proc. U. S. Nat. Mus. p. 1, Jan. 1878.

L. t. elongatâ, valde elevatâ, dorsaliter angulatâ; albidâ plus minusve cinereo et nigrotinctâ; valvis elevatis, apicibus distinctis; mucrone centrali conspicuo; sculptura ut in *L. alveolo*, sed granulis in areis dorsalis sparsim et quincuncialiter dispositis. Valva posticâ sub apicè concavâ, posticè sinuatâ. *Zona* minimâ, spiculis tenuibus versus marginem munita. Lon. 10.0, Lat. 3.0 mm. Div. 90°.

Hab.—North Pacific Ocean, in lat. 53° 08′ N., lon. 171° 19′ W., at a depth of 1006 fathoms; black sand and shells. Brought up in the sounding-cup by Capt. Geo. E. Belknap, U. S. N., on the sounding expedition of U. S. S. Tuscarora in 1874, bottom temperature 35°.5 F. (Specimens obtained by H. M. S. Challenger in Balfour Bay, Royal Sound, Kerguelen Id., Southern Ocean, in 20–60 fms., for examination of which I am indebted to the courtesy of Rev. R. J. Boog Watson, are apparently identical with Capt. Belknap's species.)

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This specimen much resembles *L. alveolus*, to which I at first referred it. A careful microscopical examination, however, shows differences which I am disposed to consider specific; but I have but one specimen, and others might show modifications in these particulars.

The differential characters are as follows: In *alveolus* the pustules are distributed evenly, closely, and in no pattern whatever, all over the surface. In *Belknapi*, they are more widely separated, and arranged in quincunx on the dorsum, the spaces seeming to radiate from the median dorsal line. In *alveolus*, the lateral areas are barely perceptible; in *Belknapi*, they are raised, concentrically rugose, and the pattern of the pustular arrangement is different and more irregular than that on the dorsum. In *Belknapi*, also, the girdle is very thin, narrow, and sparsely set with small pellucid spicules near the margin. The posterior mucro, or apex of the posterior plate, in *Belknapi*, is prominent, overhangs a shallow concavity, and from its point there diverge anteriorly four depressed lines, the outer two to the anterior lateral angles of the plate, the inner two equidistant from each other and the outer lines. Between these lines the plate is swelled, forming three rounded ridges, extending forward like the leaflets of a trefoil or clover. Nothing resembling this has been observed on any of the other species which have come under my notice.

The soft parts, in spirits, appear to resemble the other species compared with it. It is evidently adult.

It was certainly unexpected that a stone-clinging mollusk like a *Chiton* should reach such great depths as those from which this was obtained. In the same region, and at about the same depth, a *Cylichna* and a *Natica*, both apparently identical with certain Arctic species, were also obtained in the same way. Its enormous range in latitude, as indicated by the Kerguelen specimens, reminds one of the range of species in earlier geological times, and points out how relatively modern our littoral marine faunæ may be. It is not the only form common to the southern and northern oceans.

Extra-limital Species.

Leptochiton asellus.

Chiton asellus (Chemn. Spengl.) Lowe, Zoöl. Journ. ii, p. 101, pl. v, f. 3, 4, 1825.
Chiton cinereus Montague, Turton, and others, not of Linné.
? *Lepidopleurus cinereus* Sars, l. c. p. 112, pl. 7, f. 8 *a–h*, 1878; as of Linné.

Hab.—Northern seas of Europe; Lofoten Ids.; Greenland? (Morch); not New England, as erroneously stated by authors. The *cinereus* of Linné, from his type, was a *Trachydermon*.

Leptochiton fuliginatus.

Chiton fuliginatus Ad. & Rve. Conch. Icon. pl. xxvi, f. 174, 1847.

Hab.—Korea, Belcher.

Leptochiton concinnus.

Leptochiton concinnus Gld. Otia, p. 117, 1860.

Hab.—Hakodadi, Japan; Stimpson.

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Leptochiton nexus.

L. nexus Cpr. Suppl. Rep. Br. As. 1863, p. 650.

Hab.—California, Cooper.

Leptochiton internexus and var. rugatus.

L. internexus Cpr. MSS.

Hab.—California, Cooper, Canfield and Hemphill.

Hanleyia mendicaria.

Chiton mendicarius Mighels & Adams, Boston Journ. N. H. iv, p. 42, pl. iv, f. 8, 1842.

Hanleyia mendicaria Cpr. N. Engl. Chitons, l. c. p. 154, 1873.

Hab.—Casco Bay; Grand Manan, Stimpson; Portland Harbor, Me., U. S. Fish Commission. Deep-water specimens much larger than those from shallow water.

Hanleyia debilis.

Hanleyia debilis Gray, Guide, p. 183, 1857.

Chiton Hanleyi Bean, Brit. Mar. Conch. p. 232, f. 57, 1844.—Sars, l. c. p. 109, pl. 7, f. 5 *a–i*, 1878.

Hab.—British seas northward; Mageroe near North Cape, 25–300 f., Sars. Stellwagen Bank, Mass. Bay, 38 fathoms, gravel; U. S. Fish Com., 1878. Type of the subgenus. A recent addition to our Northeast American fauna.

Hanleyia (?) abyssorum.

Chiton abyssorum M. Sars, MSS.—G. O. Sars, l. c. p. 109, pl. 7, f. 4 *a–c*, pl. I, f. 6 *a–c*, 1878.

Hab.—Bergen, Norway, 150–200 fathoms, Sars, l. c.

The teeth of this species as figured by Sars agree pretty well with those of *H. mendicaria*, but neither Prof. Sars' figures nor his description afford means for determining its generic position. The valves of the two specimens figured exhibit rather remarkable differences, and, this variation admitted, the question arises, Is this more than a gigantic form of the preceding?

Hanleyia tropicalis.

A large and beautiful species from the deep waters of the Gulf of Mexico is the only other recognized species of the genus, and will be described by the writer in the Report on the Deep-sea Dredgings made under the supervision of Prof. A. Agassiz, on the U. S. Coast Survey steamer Blake, in 1878.

ISCHNOIDEA.

Genus TRACHYDERMON Cpr.

Trachydermon Cpr. Suppl. Rep. Br. As. 1863, p. 649, as a subgenus of *Ischnochiton*, type *Chiton cinereus* Lowe.

Lepidopleurus sp. auct.

> *Craspedochilus* G. O. Sars, l. c. p. 114.

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Lophyrus sp. G. O. Sars, l. c. p. 114, not of Poli.
<Boreochiton G. O. Sars, l. c. p. 115.
Leptochiton sp. auct.

Char.—Laminæ inserentes acutæ, læves; valvæ extus et intus Ischnochitoni exacte simulans; zonâ non poriferâ, squamulis minutissimis lævibus confertissime granulatâ; branchiæ breves.

This name was originally proposed as a subgenus of *Ischnochiton* to include Gray's second section, "mantle scales minute, granular" (P. Z. S. 1847, p. 147; Guide, p. 182, 1857). In all other conchological characters, the group accords with that genus, but the animal differs in having the gills either entirely posterior or reaching forward from the tail only to about the middle of the foot, while in *Ischnochiton* and *Chiton* they travel to its anterior extremity. These characters indicate a transition between the Ischnoid and Leptoid Chitons by means of *Trachydermon* and *Tonicella*. Guilding called the radula of Chitons "Trachyderma"; but as the name has not been adopted, no inconvenience is likely to ensue. (Cpr. MSS.)

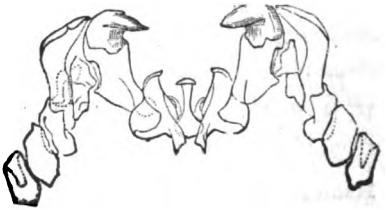

FIG. E.—Teeth of *Trachydermon cinereus* Lowe; after Lovén.

The genus is chiefly northern in its distribution. *Chiton marginatus* of authors (Pennant's species being indeterminable) and *C. cinereus* (Linn.) Lowe, are identical, according to Dr. Carpenter, the best authority on the subject, as well as Hanley and others. The "*Lepidopleurus*" *cinereus* of Sars is not the Linnean species, which is the type of *Trachydermon*, but a *Leptochiton*. His *Craspedochilus marginatus* (whether the *Chiton marginatus* of Pennant or not) is a *Trachydermon*, and not improbably the true *cinereus* of Linné, which has been recognized, not from the insufficient description in the Syst. Naturæ, but from his typical specimens, through the invaluable labors of Mr. Hanley.

Trachydermon ruber.

Chiton ruber Linn. S. N. ed. xii, p. 1107, 1766.—Lowe, Zoöl. Journ. ii, p. 101, pl. 5, f. 2, 1825.—Gould, Inv. Mass. p. 149, f. 24, 1841.—Forbes & Hanley, Brit. Moll. ii, p. 399, pl. lix, f. 6; AA, f. 6, 1853.—Hanley, Shells of Lin. p. 17, 1855.—Sowerby, Conch. Ill. Chiton, f. 103–4, 1839.—Reeve, Conch. Icon. Mon. Chiton, pl. 25, f. 175, 1847.—Jeffreys, Brit. Conch. iii, p. 224, 1865; v, p. 199, pl. lvi, f. 4, 1869.—Binney's Gould's Inv. Mass. p. 260, f. 523, 1870.

Chiton cinereus O. Fabr. Faun. Grönl. p. 423, 1780; not of authors, nor of Linn.; Ib. Dillwyn, Cat. Rec. Sh. p. 12, 1817.

Chiton minimus Spengler, Skrift. Nat. Selsk. iv, 1, 1797, fide Lovén, not of Gmelin and Chemnitz.

Chiton lævis Lovén, Ind. Moll. Lit. Scand. p. 28, 1846; not of Montague, Forbes and Hanley, etc.

Chiton lævis Pennant (probably), Brit. Zool. ed. iv, vol. iv, p. 72, pl. 36, f. 3, 1777 (bad).

Chiton latus Leach, Moll. Brit. p. 231, 1852, Doc., fide Jeffreys; not of Lowe, 1825.

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Trachydermon ruber.

Chiton puniceus Couthouy (MS.).—Gld. Otia Conch. p. 5, 1846 (probably).
Leptochiton ruber H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.
Chiton (Lepidopleurus) ruber Jeffreys, Brit. Moll. iii, p. 210, 1865.
Trachydermon ruber Carpenter, Bull. Essex Inst. v, p. 153, 1873.
Boreochiton ruber G. O. Sars, Moll. Reg. Arc. Norv. p. 116, t. 8, f. 4 *a–l*, t. II, f. 3 *a–o* (imperfect), June, 1878.

Tr. t. mucrone mediano, satis elevato: *intus*, v. post. 9–11-, ant. 8–11-, centr. 1-fiss. lævi; dent. interdum solidioribus, interdum postice rugulosis; subgrundis modicis; sinu lato, planato; *zonâ* normali; branchiis submedianis. Lon. 25, Lat. 8 mm.

Hab.—Northern seas, widely distributed; whole coast of Norway, low water to 40 f. (Sars); Arctic and northern seas of Europe; Adriatic? (Olivi!); Spitzbergen, Iceland and Greenland, New England, Gulf of St. Lawrence and Labrador coasts; Tartary (Lischke); Kamchatka; and in Alaska from the Pribiloff Islands westward to Attu and southward to Sitka, low water to 80 fathoms, on stones and shells; probably also to Bering Strait northward. Two hundred specimens examined. ?Orange Harbor, Patagonia, as *C. puniceus*.

This shell is apparently smooth, as described by Forbes and Hanley, but under a high power appears finely reticulated, as observed by Jeffreys. Its color is very variable, being usually marbled red and whitish, like *Tonicella marmorea*, but the valves may be uniform dark red or nearly pure white. I have one specimen with the four central valves dark red and the rest white; one valve in a specimen is often dark red, while all the others are marbled. It is most likely to be confounded with *Tonicella marmorea* and some varieties of *T. lineata*, both of which have leathery girdles, while this species can almost always be determined by its farinaceous girdle, dusted with alternate red and whitish patches, the latter nearly opposite the sutures.

The identity or locality of Dr. Gould's specimen, described as *C. puniceus* Couthouy, and supposed by Dr. Carpenter to be probably the same as our northern species, seems questionable.

This species has been much confused by European authors, who have persisted in referring the Linnean name to *T. marmorea* Fabr., and resurrecting the indeterminate figure of Pennant for this species, though Mr. Hanley has determined the identity of the Linnean specimen with this species, and he did not possess the *marmorea*. The synonymy here quoted is only such as certainly belongs to this species.

Though not collected in a fresh state by me north of the Pribiloff Islands, I have little doubt that broken valves found in bird-dung at Plover Bay, near Bering Strait, are properly referable to this species. It is one of the most abundant Alaskan Chitons, and grows to the length of an inch.

The gill-rows extend forward for three-quarters the length of the foot, each row containing twenty to twenty-five branchiæ. The mantle-edge is very narrow and plain; there is no veil, and the muzzle is plain, some-

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what produced behind into two corners. The eggs in part of the ovisac were well developed, and resembled the figure of the youngest stage given by Lovén. Anus median, inconspicuous, close to the mantle-edge. On each side of it, midway between it and the posterior ends of the gill-rows, is a fold containing the ovarian fenestræ. The number of openings varies from three to six in different individuals. They are linear, oblique, and close together. They are more strongly marked in this species than in any other Chiton I have examined.

Trachydermon albus.

Chiton albus Lin. S. N. ed. xii, p. 1107, No. 8, 1766.—Lowe, Zoöl. Journ. iii, p. 80, 1826.—Fabricius, Faun. Grönl. p. 422, 1780.—Sowerby, Conch. Ill. Chiton, f. 99, 100, 1839.—Gould, Inv. Mass. p. 150, f. 21, 1841.—Lovén, Ind. Moll. Lit. Scand. p. 27, 1846.—Middendorf, Mal. Ross. i, p. 120, 1847.—Forbes & Hanley, Brit. Moll. ii, p. 405, pl. lxii, f. 2, 1853.—Hanley, Shells of Lin. p. 17, 1855.—Stimpson, Sh. of New Engl. p. 28, 1851; Ib. Mar. Inv. Grand Manan, p. 22, 1853.—Jeffreys, British Conch. iii, p. 220, 1865; v, p. 199, pl. lvi, f. 3, 1869.—Binney's Gould, p. 263, f. 525, 1870.

? Chiton oryza Spengler, Skrift. Nat. Selsk. Bd. iv, Hft. 1. 1797 (fide Jeffreys).

Chiton aselloides Lowe, Zool. Journ. ii, p. 103, t. 5, f. 3, 1825.—Wood, Ind. Test. Suppl. pl. 1, f. 9, 1828.

Chiton sagrinatus Couthouy, Am. Journ. Sci. xxxiv, p. 217, 1838; Ib. Bost. Journ. Nat. Hist. ii, p. 82, 1838.

Leptochiton albus H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

C. (Lepidopleurus) albus Jeffreys, Brit. Conch. iii, p. 210, 1865.

Trachydermon albus Carpenter, New Engl. Chitons, Bull. Essex Inst. v, p. 153, 1873.

C. (Leptochiton) albus Mörch, Moll. Greenl. 147, 1875.

Lophyrus albus G. O. Sars, Moll. Reg. Arc. Norv. p. 114, t. 8, f. 2 *a–b* (probably not t. I, f. 9 *a–b*), June, 1878.

? Lophyrus exaratus G. O. Sars, l. c. p. 113, t. 8, f. 1 *a–k*, t. ii, f. 1 (bad).

? C. minimus Gmel. S. N. p. 3205, 1788. (Bergen.)

Tr. t. mucrone mediano, parum elevato; *intus*, v. post. 10-, ant. 13-, centr. 1-fiss.; dent. acutissimis, posticis interdum serratis; subgrundis spongiosis; sinu modico, undulato, haud angulato, lævi; *zonâ* squamulis solidioribus; branchiis medianis. Lon. 10, Lat. 5–6 mm. Div. variable.

Hab.—Arctic and boreal seas, Atlantic and Pacific. British seas south to the Isle of Man; Scandinavian seas, 10 to 100 fathoms (as *exaratus* to 200 fathoms); Spitzbergen; Iceland; Greenland, White Sea; Gulf of St. Lawrence; Massachusetts Bay; on the Pacific from the Arctic Ocean south to the Shumagins and west to Kyska and probably to Attu, low water to 80 fathoms, on stones and shells. Two hundred and forty-eight specimens examined.

The synonymy of this species might have been much enlarged under the old name of *Chiton albus*, but to no particular purpose. It is a well-known and characteristic Arctic shell. American and particularly deep-water Alaskan specimens are larger, finer, and better display the scales of the girdle than European specimens. Sars' *exaratus* would seem to be probably of this description.

It seems also to be more common to the westward. Its chief pecu-

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liarity is that the central plates of the tail-valve are broken by serrations, and that the scales are large and gravelly.

The gills are twenty to twenty-five in number, the rows extending to the head. Mantle-edge narrow, plain. There is no veil, and the semicircular muzzle is also plain. Anus terminal, papillate. Ovarian openings single, on each side, the posterior end of the gill-row passing behind them. The oviducts, as in some other species, could not clearly be made out. The ovisac or ovary is irregularly shaped and single.

The figure (pl. I, f. 9 *a*) strongly suggests that Prof. Sars, by inadvertence in selecting a specimen for examination of the radula, got hold of one of the extremely similar Leptochitons, since it does not resemble the radula of *T. albus*, of which I have examined both American and European specimens. On the other hand, the not particularly commendable figure of the radula of *L. exaratus* Sars looks more like *albus* than anything else.

? Trachydermon lividus.

Chiton lividus Midd. Mal. Ross. i, p. 124, pl. xiii, f. 3 *a–g*, 4, 1847.

Hab.—Sitka, Alaska Territory.

This species (and *C. scrobiculatus* Midd. from California) probably belongs to this genus, but the descriptions and figures are not sufficiently clear to have admitted of their identification up to the present time. The character most emphasized by Middendorf in *C. lividus* is a keystone-like projection filling the anterior sinus between the two sutural laminæ. The specimen on which the description was based was a very small and perhaps immature creature, with faint sculpture, somewhat recalling *Mopalia Hindsii*.

Extra-limital Species.

Trachydermon cinereus.

Chiton cinereus (Lin.) Lowe, Zoöl. Journ. ii, p. 99, 1825.—Forbes & Hanley, Brit. Moll. ii, 402, pl. lviii, fig. 1, 1853 (not of Sars).
Trachydermon marginatus Cpr. New Engl. Chitons, l. c. p. 153, 1873.
Craspedochilus marginatus Sars, l. c. p. 115, t. 20, f. 16 *a–h*, t. II, f. 2, 1878.

Hab.—British and Scandinavian seas, north to Lofoten, south to Vigo Bay, between tides and to the Laminarian zone. Type of the genus.

Trachydermon dentiens.

Chiton dentiens Gld. Otia, pp. 6, 242, 1862.
Ischnochiton (*Trachydermon*) *pseudodentiens* Cpr. Suppl. Rep. l. c. p. 649, 1863.

Hab.—Puget Sound and Vancouver Island.

The fact that the "teeth" are merely peculiar color-marks does not render it necessary to dispense with the original name of Dr. Gould.

Subgenus TRACHYRADSIA Cpr. MSS.

Trachydermon, valvis centralibus bi- seu pluri-fissatis. Type *Chiton fulgetrum* Reeve.

Trachyradsia aleutica.

T. aleutica Dall, Proc. Nat. Mus. p. 1, Jan. 1878.

T. t. parvâ, rufocinereâ, oblongâ, fornicata, jugo acutissimo; mucrone

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submediano, apicibus prominentibus; ar. lat. inconspicuis; totâ superficie quincuncialiter minute reticulatâ; *intus*, v. ant. 16, post. 11, centr. 2-fissatâ; dent. parvis perspongiosis, late separatis; subgrundis spongiosis, curtis; sinu parvo; *zonâ* squamulis minutis obsitâ. Lon. 6, Lat. 3 mm.

Hab.—Kyska Harbor, Kyska Id. Constantine and Kiriloff Harbors, Amchitka Island, and Nazan Bay, Atka, in the Western Aleutians, at low-water mark, under stones on the beach, Dall! Fifteen examples.

This modest little species is of a dull livid purplish red, with an ashy tinge, especially on the narrow girdle. Except for the well-marked ridges of growth, it appears smooth, but possesses (like all Chitons) a fine reticulation, only visible under a magnifier. The lateral areas are not distinct, the back is very much rounded, and the valves well hooked in the median line. The substance of the valves from within appears remarkably spongy, as if rotten, or even like vesicular pumice, especially under the eaves. The anterior slits are marked by radiating lines of holes, though the teeth between them can hardly be made out. The posterior valve, however, has not this aid to counting, and in the general sponginess it is almost impossible to say how many teeth or denticles exist. It bears no marked resemblance to any other species of the region.

Genus TONICELLA Cpr.

Tonicella Cpr. Bull. Essex Inst. v, p. 154, 1873. Type *T. marmorea* Fabr.
Tonicia sp. Adams, Gray, Cpr. and others.
< *Boreochiton* G. O. Sars, Moll. Reg. Arc. Norv. p. 116, June, 1878.

Valvæ, mucro, laminæ et sinus plerumque ut in Ischnochitone; zonâ ut in Toniciâ, coriacea, lævis, seu sublævis: branchiæ mediæ.

The genus *Tonicia* Adams and Gray, to which the species of *Tonicella* have often been referred, has pectinated insertion-plates and ambient gills like the typical Chitons, while *Tonicella* has sharp plates and short rows of gills. The two groups also differ in their dentition. The major lateral of *Tonicella* is strongly tridentate; in *Tonicia* the cusp of the major lateral is scoop-shaped, rounded, with a plain edge, and the radula recalls that of *Chiton* (typical) and *Corephium*. Prof. Sars appears to have been unaware of Dr. Carpenter's publication on the New England Chitons.

Tonicella marmorea.

Chiton marmoreus Fabricius, Faun. Grönl. 420, 1780.—Midd. Mal. Ross. i, p. 103, 1847; Sib. Reise, 182, 1851.—Forbes & Hanley, Brit. Moll. ii, p. 414, pl. lviii, f. 2, pl. lix, f. 4, 1853.—Jeffreys, Brit. Conch. iii, p. 227, 1865, v, p. 199, pl. lvi, f. 7, 1869.

Chiton ruber Spengler, Skrift. Nat. Selsk. iv, p. 92, 1797.—Lovén, Ind. Moll. Scand. p. 28, 1846; not of Linné.

Chiton lævigatus Fleming, Edin. Encycl. p. 113, t. vii; Brit. An. p. 290, 1828.—Reeve, Conch. Icon. Chiton, pl. 27, f. 179, 1847.

? *Chiton punctatus* Ström (Jeffreys)?, Acta Nidr. iii, p. 433, t. vi, f. 14.

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Tonicella marmorea.

Chiton latus Lowe, Zool. Journ. ii, p. 103, pl. 5, f. 6-7, 1825.—Sowerby, Conch. Ill. Chiton, f. 113, 1839.

Chiton fulminatus Couthouy, Best. Journ. Nat. Hist. ii, p. 80, pl. 3, f. 19, 1838.—Gould, Inv. Mass. i, p. 148, f. 3, 1841.

Chiton pictus Bean, Thorpe's Brit. Mar. Conch. p. 264, pl. —, f. 56, 1844.

Chiton Flemingius Leach, Moll. Gt. Brit. p. 230, Dec. 1852.

Tonicia marmorea H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.

Tonicella marmorea Carpenter, Bull. Essex Inst. v, p. 154, 1873.

Boreochiton marmoreus G. O. Sars, Moll. Reg. Arct. Norv. p. 116, t. 8, f. 3 *a-l*, t. II, f. 4 (not good), 1878.

T. t. elongatâ, valvis ut in "Trachydermon ruber" picturata; zonâ coriaceâ, expansâ, lævi; intus, v. post. 8–9, v. ant. 8–10, v. centr. 1-fissatâ; sinu angusto, altiore, lævi. Lon. 40, Lat. 24 mm.

Hab.—Aleutian Islands, 8–10 fms., rare; east coast of North America from Massachusetts Bay northward to Greenland; every part of the North Atlantic north of Great Britain, and as far south as Dublin Bay on the west and the shores of Holland on the east; in 5–100 fathoms, according to temperature.

This well-known species has almost exactly such a color-pattern as *Trachydermon ruber*, and in dry specimens the pilose girdle of the latter is the most convenient means of distinction. A comparison of European with Greenland specimens shows that the latter are usually more elevated, and the posterior valve has usually seven slits instead of eight or nine. This form, of course, is the typical one; those from Europe may perhaps retain the varietal name of *T. latus* Lowe. The Alaskan specimens, as is often the case with mollusca of this region, are more like European than East American specimens, and in the fresh condition exhibit a very broad, smooth, yellowish girdle, sometimes as wide on each side of the valves as the whole width of the shelly part. Otherwise they agree with Norwegian specimens. The measurements given above are for the very largest; they average about an inch in length. It doubtless extends to the Arctic Ocean on the shores of Alaska, though all our specimens happened to come from the Aleutians.

Jeffreys states that this may be identical with *C. punctatus* Strøm, but the name would be an evident misnomer, as it is in no way punctate, and the identification requires further confirmation.

Middendorf found a variation in the number of anterior slits, being five to seven, and in posterior slits six to nine, in all, in the specimens he examined, which came from the White Sea and Arctic coast of Russian Lapland.

An attempt has been made to identify this species with *C. ruber* Lin., but the examination of the Linnean Chitons by Mr. Hanley has left this theory no sound foundation, and it hardly requires further notice.

The gill-rows of this species extend forward three-quarters the length of the foot, and each contains twenty to twenty-five branchiæ. Mantle-edge plain, inconspicuous, very narrow. The margin of the muzzle is

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puckered up in front, with the posterior corners produced into lappets. There is no veil. Oviducts not clearly made out. The ovarian openings are simple and close on each side of and a little behind the anus, from which a ridge extends in front of them on each side. But there appear, also, to be two openings in the vicinity of the fourth or fifth branchia from the posterior end of the gill-rows, one on each side. The contracted condition of the specimens, from the effect of the alcohol in which they were preserved, prevented a satisfactory confirmation of these appearances.

Tonicella lineata.

Chiton lineatus Wood, Gen. Conch. p. 15, pl. 2, f. 4–5, 1815.—Midd. Mal. Ross. i, p. 109, t. xii, f. 8–9, 1847.—Reeve, Conch. Icon. Mon. Chiton, pl. vii, f. 33, 1847.

Tonicia lineata H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.

Chiton (Hamachiton, Stenosemus) lineata Midd. Mal. Ross. i, p. 34.

Tonicella lineata Carpenter, MS.

T. t. mucrone antice mediano, satis elevato; intus, v. ant. 9–12-, v. post. 8–10-, v. centr. 1-fissatâ; dent. obtusioribus (t. jun. acutis), posticis curtioribus, vix interdum rugulosis; subgrundis curtis, spongiosis; sinu angusto, alto, lævi, angulato; branchiis medianis; testâ externâ subelevatâ, tegmentum læve, areis lateralibus vix distinctis; flavum aut fuscum, lineolis albis pictum, zonâ coriaceâ, oculo nudo lævis. Lon. 30, Lat. 15 mm. Div. 120°.

Hab.—From Bering Strait south, on both coasts; westward to Japan and the Okhotsk Sea; eastward to the Bay of Monterey, California, and including the whole Aleutian chain; low water to 60 fathoms. Two hundred and eighty specimens examined of the typical form.

The painting of this very characteristic species is very variable, even on different valves of the same individual. Nothing can appear more distinct than the coloration of typical specimens of some varieties, but in a large series the differences do not hold equally good. The number of slits is also somewhat variable, occasional abnormal or injured specimens having only six or seven slits in the tail-valve. But fine and normal specimens of both varieties show no more than individual variations.

Middendorf, while pointing out the distinctions between the following species and *T. marmorea*, appears to have overlooked the connection between the former and *T. lineata*, and his description does not always agree with his figures.

From *Tonicia lineolata* Sowerby, from South America, beside the internal generic characters, the exterior differs by the absence of punctures and raised granules at the sides.

T. submarmorea is further distinguished from *lineata* by the somewhat raised lateral areas, which are hardly perceptible in the present form. It is one of the handsomest Alaskan Chitons. The southern specimens, especially those from Monterey, generally have the yellow and brown lines marginated with blue, which produces a peculiar color-effect.

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The gill-rows extend forward two-thirds the length of the foot. They contain about twenty-seven branchiæ on each side. The mantle-edge is very narrow, hardly distinguishable around the head. There is no veil. The edge of the muzzle is marginated all around, and drawn into flaps at the posterior corners.

Tonicella submarmorea.

Chiton submarmoreus Midd. Bull. Acad. Sci. St. Pétersburg, iv, No. 8, 1846; Mal. Ross. i, p. 98, 1847; Ib. Sib. Reise, p. 178, pl. xiv, f. 7–10, xv, f. 7–8, 1851.

Chiton insignis Reeve, Conch. Icon. Mon. Chiton, pl. xxii, No. 149, f. 148, 1847.

T. t. ut in forma præcedente, sed testâ externâ ex rosea flavoque alba, maculis flammulisque sed rufis, sed albis pictâ; tegmentum zonæ lævissculum, nitidulum, flavum aut fuscum pictum.

Hab.—Japan and the Okhotsk Sea, Aleutian Islands to Sitka and Fuca Strait. It has not been found north of the Aleutians or south of Washington Territory.

In the description of this form, Middendorf, in distinguishing it from *T. marmorea*, seemed to overlook its relations to *T. lineata*, from which, for some time, I was indisposed to specifically separate it. The peculiar color of the valves is reproduced sporadically on some valves of *T. lineata* in occasional specimens; though these may be due to hybridization. The dentition, elsewhere figured, indicates, however, that the two forms are specifically distinct. The soft parts are very similar to those of *T. marmorea* in every respect except that the openings near the anus were absent. The specimen was a male, and the structure of the spermsac recalled that of *Acmæa*. Some of these differences may be sexual; at all events, the subject requires investigation from living specimens.

Tonicella saccharina.

Tonicella saccharina Dall, Proc. Nat. Mus. p. 2, Jan. 1878.

T. t. parvâ, oblongâ, totâ superficie saccharinâ rufo et albescente pictâ; mucrone submediano, inconspicuo; ar. lat. inconspicue elevatis, ar. dors. sanguinosis, æque quincuncialiter lente reticulatâ; v. ant. 10–11-, v. post. 8–10-, v. centr. 1-fissatâ; dent. parvis, spongiosis; sinu parvo; subgrundis spongiosis, mediocris; zonâ coriacea ut in *Tonicellæ* aliis. Branchiis mediis. Lon. 6.5, Lat. 4 mm.

Hab.—Aleutian and Shumagin Islands; Kyska, Unalashka, and Koniushi, 3 to 13 fathoms on stones! St. Paul, Pribiloff Ids., 15 fathoms. Seven specimens examined.

This interesting little species has the lustre of rock-candy, through which the microscopic reticulation is barely perceptible. It is marked, in all the specimens obtained, by the red wine colored dorsal areas contrasted with a waxy white color of the lateral areas, rendering its recognition easy. The girdle is dark, leathery, narrow, slightly pubescent,

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and furnished at its extreme margin with a fringe of fine spiny hairs or spicules, as in *T. marmorea*.

? Tonicella Sitkensis.

Chiton Sitkensis Midd. Bull. Acad. Sci. St. Pétersb. vi, p. 121, 1846; Mal. Ross. i, p. 112, t. xiii, f. 1–2, 1847.
Tonicia Sitkensis H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.
Not *Chiton Sitkensis* Reeve, Conch. Icon. sp. 55, 1847.

?T. t. externa depressa; tegmentum lævisculum, areis lateralibus indistinctis, sub lente sparsim granulosum, rubicundum; limbi lævisculi epidermis zonalis submicroscopio stroma exhibet spinulis latentibus erectis munitum; v. ant. 8-, v. post. 10-, v. centr. 1-fissata; branchiæ posticæ, parcæ, no. circ. 24. Lon. 10, Lat. 6 mm. Div. 130°.

Hab.—Sitka, one specimen (Midd.).

The above species described by Middendorf, if not a variety of one of the others, has not yet been identified or collected by any other naturalist. His description differs very much from his figures, while the anterior teeth are figured as grooved outside; if correct, an unusual character. It is said to be nearest to *T. submarmoreus*, and may well be a young specimen of one of its numerous varieties.

Genus SCHIZOPLAX Dall.

Schizoplax Dall, Proc. Nat. Mus. p. 2, Jan. 1878.
Tonicia sp. H. & A. Adams.
Schizoplax Cpr. MS. (subgenus of *Tonicella*).

Testa et zona Tonicellæ simulans; valvæ centrales sulco jugali mediano, antico argute incisæ; branchiæ subambientes.

For this remarkable form, which is distinguished from all other known Chitons by the median slit in all the central valves, I propose to adopt the MS. name suggested by Dr. Carpenter on Middendorf's figures, raising its value, however, to the rank of a genus. The specimens obtained by us appear to be the first obtained by any one since the original specimens of Middendorf.

Schizoplax Brandtii.

Chiton Brandtii Midd. Bull. Acad. Sci. St. Pétersb. vi, p. 117, 1846; Mal. Ross. i, p. 128, 1847.
Chiton (Hamachiton, Stenosemus) Brandtii Midd. Sib. Reise, p. 174, t. xv, f. 1–6, 1851.
Tonicia Brandtii H. & A. Adams, Gen. Rec. Moll. i, p. 474, 1854.
Schizoplax Brandtii Dall, Proc. Nat. Mus. p. 2, Jan. 1878.

S. t. ovali, longiori, angustiori, satis elevatâ; jugo rotundato; olivaceo-fusca, cæruleo seu strigatâ, seu maculatâ seu nebulosâ; sæpe irregulariter castaneo; mucrone centr. irregulariter subplanato; v. post. omnino satis regulariter excurvatâ; ar. jug. nonnisi colore definitis, ar. lat. vix definitis, totâ superficie lævore, sub lente conspicue quinc. granu-

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latâ; *zona* angusta, olivaceo-cinereo maculatâ, confertim spinulis minutis ornata, oculo nudo sublævis; submicroscopio epidermis dorsalis pubescens, stroma spinulis rarioribus latentibus erectis; mucro indistinctis in summa tamen linea mediana valvarum intermediarum superne sulcus decurrit linearis, longitudinalis, argute incisus; sinu jugali modico, alto, haud laminato, conspicue spongiosa, subgrundis minimis, maxime spongiosis; v. ant. 11-, post. 11-, centr. 1-fiss. Branchiæ circ. 22, subambientes. Lon. 16, Lat. 5 mm. Div. 140°.

Hab.—Shantar Bay, Okhotsk Sea, Midd.; Aleutian Islands eastward to Sitka Harbor, low water to 12 fathoms on stones and shells; Dall! Ninety-three specimens examined.

This very remarkable species is very prettily marbled with olive, chestnut, and blue; the girdle generally dark olive, dashed with ashy spots and in fine specimens having a pubescent appearance. The slit is occupied by a cartilaginous substance of a dark brown color, most visible from within. The branchiæ appear to reach nearly to the head. It is quite possible that it may reach as far south as Puget Sound.

The soft parts are yellowish white. The gill-rows extend three-fourths of the length of the foot forward from their posterior termination, and each contains about twenty-two branchiæ. Mantle-edge thick, plain; veil small, plain. Muzzle small, plain, with two large squarish lappets at the posterior corners. The supposed oviducts open on each side through a small rounded papilla in the vicinity of the third or fourth branchia counting forward, and between the line of the gill-row and the side of the foot.

Genus CHÆTOPLEURA Shuttleworth.

Chætopleura Shuttlew. Bern. Mitth. Juni 1853. Type *Chiton Peruvianus* Lam.
<*Chætopleura* H. & A. Adams, Gen. Rec. Moll. i, p. 475, 1854.
<*Acanthopleura* Gray, P. Z. S. 1847, p. 67.

Testa Ischnochitoni similis; zonâ plus minusve pilosâ. Branchiæ ambientes.

Chætopleura Hartwegii.

Chiton Hartwegii Carpenter, P. Z. S. 1855, p. 231.
Trachydermon Hartwegii Cpr. Suppl. Rep. Br. Assoc. 1863, p. 649.

C. t. colore olivaceo, cinereo seu rufo-fusco seu cupreo-viridi, sæpe eleganter maculoso; intus, intense cæruleo-viridi; mucrone mediano satis elevato; valvis singulis tumentibus, eleganter arcuatis, apicibus conspicuis, suturis marg. distinctis; ar. diag. haud nisi costis tumentibus subobsoletis discernendis; totâ superficie super granulis minimis, sub lente solum distinguendis, granis parvis ubique sparsis; super ar. diag. et v. term. granis majoribus irregulariter verrucosis; intus v. post. 9–12-, ant. 10–11-, centr. 1-fissatis; dent. solidis, obtusis, interdum subru-

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gulosis, valde separatis; subgrundis spongiosis, parum extantibus; sinu alto, lato, planato, spongioso, haud laminato; paginâ internâ callosâ; zonâ fuscâ, minutissime granulosâ, inter granulas setis pellucidis minimis huc et illuc decurrentibus. Lon. 25, Lat. 16 mm. (Cpr. MS.)

Hab.—Columbian Archipelago, probably reaching the southern borders of Alaska, and southward to Magdalena Bay, Lower California. Forty specimens examined.

This species having been originally described from imperfect specimens, I insert Dr. Carpenter's amended diagnosis. It has not occurred in our collections, but being abundant in the Vancouver region, doubtless occurs in Southeastern Alaska. It is an aberrant species, and at some time may require to be separated from the genus to which Dr. Carpenter and myself have provisionally referred it.

Chætopleura Nuttallii.

Chiton Nuttallii Cpr. P. Z. S. 1855, p. 231.
Trachydermon Nuttallii Cpr. Suppl. Rep. Br. Assoc. 1863, p. 649.

C. t. mucrone satis planato; intus v. post. 11-, ant. 8-, centr. 1-fissatâ; aliter ut in *C. Hartwegii* formatâ.

Hab.—With the last, also probably in Alaska.

All the specimens examined appear to differ from *C. Hartwegii* in the broad non-swelling valves, squared at the sides, and not beaked or waved. It may yet prove merely a variety. The characters of the mantle and interior are aberrant, as in the last species.

Genus ISCHNOCHITON.

Ischnochiton Gray §*, P. Z. S. 1847, pp. 126–7.
Lepidopleurus Ad. Gen. Rec. Moll. i, 471, 1854.

Testa tenuior; lam. insert. regulares, acutæ, nec pectinatæ nec serratæ; subgrundæ majores; sinus plerumque lævis; zona squamosa, squamis plerumque striatis; branchiæ elongatæ. (*Cpr.*) Type *I. longicymba* Quoy.

The main character of this genus, which includes by far the largest number of species of any single group of Chitons, consists in the row of sharp smooth insertion-teeth, surrounded by more or less projecting eaves, as first described by Dr. Carpenter in the Mazatlan Catalogue (p. 194), and in the scaly girdle. Dr. Carpenter has divided the group by its minor characters into the following subgenera:

1. *Stenoplax* Cpr ..... *C. limaciformis* Sowerby.
   Body elongate. Scales elongate, chaffy, striated, irregular, and crowded.
2. *Stenoradsia* Cpr ..... *C. magdalenensis* Hinds.
   Like *Stenoplax*, with numerous side-slits.
3. *Ischnoplax* Cpr ..... *C. pectinatus* Sowerby.
   Like *Stenoplax*, but with occasional large scales rising above the rest, and a multitude of short striated bristles. Mucro raised, subposterior.

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4. *Heterozona* Cpr.....*H. cariosa* Cpr.
Body elongate; two kinds of rather solid, striated scales.

5. *Ischnochiton* (restricted) Cpr.....*C. longicymba* Quoy.
Scales transverse, flattened, somewhat imbricated, generally striated.

6. *Ischnoradsia* Cpr. ex Shuttleworth.....*C. dispar* Sowerby.
Scales striated. Central valves with many slits.

7. *Lepidopleurus* Cpr.....Ex *C. Mertensi* Midd.
Scales solid, imbricated, smooth.

8. *Lepidoradsia* Cpr.....*C. australis* Sowerby.
Similar to the last, with many slits in central valves.

The only Alaskan species of the restricted subgenus, so far as known, is the following form.

Ischnochiton interstinctus.

Chiton interstinctus Gould, Moll. U. S. Expl. Exp. p. 322, pl. 27, f. 423, *a*, *b*, 1852.
C. (*Leptochiton*) *interstinctus* Gould, Otia, p. 230, 242, 1862.
Callochiton interstinctus H. & A. Adams, Gen. Rec. Moll. i, p. 471, 1854.
Trachydermon interstinctus Cpr. Suppl. Rep. Br. As. 1863, p. 649.
Ischnochiton interstinctus Cpr. MS. 1871.

I. t. mucrone antice mediano, satis elevato; *intus* v. post. 12-, ant. 10-, centr. 1-fiss.; dent. acutis; subgrundis modicis; sinu lato, planato; *zonâ* squamulis subovalibus, tenuissime striatis. Lon. 17, Lat. 7 mm. Div. 110°.

Hab.—Sitka Harbor, 12 fathoms, mud and gravel! south to Monterey and the Santa Barbara Islands, California. Eighty-seven specimens examined.

This is a modest little species of a dark red color, mottled with light about the jugum. The riblets are somewhat broken into tubercles by the lines of growth. It appeared to be very abundant at Sitka in the locality where it was found. There are no other species likely to be confounded with it in this district.

The gill-rows are nearly as long as the foot. The muzzle is produced into lappets at the corners. No data in regard to the fenestræ could be obtained from the dry specimens.

Ischnoradsia trifida.

Trachydermon trifidus Cpr. Suppl. Rep. Br. As. 1863, p. 649; Proc. Phil. Acad. Nat Sci. 1865, p. 60.

I. satis magnâ, satis elevatâ, regulariter ovali; rufo-castaneâ, pallidiore et intensiore maculatâ; jugo acutiore, gothico; mucrone mediano, planato; totâ superficie vix minutissime granulatâ; ar. centrali lineis transversis, jugo perpendicularibus circ. VIII altissime punctatis; ar. lat. valde definitis, costis obsoletis II–IV, interdum ad interstitiis punctim-depressis; intus, pagina internâ albido-carneâ, radiis II rufo-purpureis ab umbonibus planatis divergentibus; v. post. 13-, v. ant. 13-, centr. 2-fissatis, dentibus acutis interdum ad margines serratis, interdum extus striatis sed interdum normaliter lævibus; subgrundis conspicuis sub-

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spongiosis; sinu minore, laminato, laminâ atroque latere et interdum in medio fissatâ; zonâ squamulis perparvis, solidioribus, irregulariter instructis lævibus, instructâ; branchiis fere ambientibus, per valvas VI posticus continuis. Lon. 40, Lat. 26 mm. Div. 135°.

Hab.—Sitka, Port Etches, 9–18 fms., gravel, rare; south to Puget Sound. Six specimens examined.

This rare and fine species is not particularly handsome, being of dull and livid colors, but is peculiarly characterized by the straight transverse ribs on the dorsal areas, with spongy interspaces, and by the pretty regular division of the lateral areas into three well-marked radiating costæ, which are separated in the insertion-plate by two fissures. No other species of the region resembles this in sculpture. Muzzle with a pectinated margin in front produced into rounded lappets at the corners. Gill-rows as long as the foot, containing each 28–35 branchiæ. Veil absent. Mantle-edge plain, narrow. There is a small spherical lump on each side of the girdle just behind the posterior ends of the gill-rows, which are turned out toward the girdle and widely separated behind. The anus is large, median, and crenate, opening on the upper part of the hinder end of the foot. No ovarian openings could be detected, and the species presents some peculiarities which call for further research with more material.

Subgenus LEPIDOPLEURUS s. s. Cpr.

Lepidopleurus Mertensii.

Chiton Mertensii Midd. Bull. Ac. Sci. St. Pétersb. vi, p. 118, 1846.
Chiton (*Phænochiton, Hamachiton, Stenosemus*) *Mertensii* Midd. Mal. Ross. p. 34, 125, pl. xiv, f. 1–3 *a–h*, 1847.
Leptochiton Mertensii H. & A. Adams, Gen. Rec. Moll. i, p. 473, 1854.

L. t. colore rubido, interdum intensiore nebuloso; mucrone subcentrali, haud elevato; *intus* v. term. 9–12-, centr. 1 fiss.; dent. acutis; subgrundis majoribus; sinu lato, planato, lævi; *zonâ* rubidâ seu pallidiore, squamis ovoideis, nitentibus, lævibus vix regulariter confertissime imbricatâ. Lon. 20, Lat. 6 mm. Div. 100°.

Hab.—Sitka and vicinity, south to Monterey, Cal. Many specimens examined.

Middendorf's description and figures of this shell do not agree well together. Its fine red color, sharp and prominent sculpture, usually free from erosion or nullipore, and beautifully shining and regular scales, render this one of the most attractive and easily recognized of the Alaskan Chitons. There are no others in that region likely to be confounded with it. It rarely shows a white valve or a dash of white on some of the valves.

The soft parts of this species are whitish. The anus is on a papilla. Mantle-edge narrow, granulose, forming on each side behind the last branchia a rounded lump or tumor. Near this the ovarian openings were thought to be detected. Muzzle semicircular, cornered behind on

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each side. No veil. Gill-rows three-quarters as long as the foot, each containing about forty branchiæ.

(In *Lepidoradsia australis*, the gill-rows were found to extend the whole length of the foot, and to contain forty-seven branchiæ in each. Mantle-edge plain, thin; muzzle plain, semicircular, without a veil; the ovarian openings situated close on either margin of the anus.)

ACANTHOIDEA.

Genus NUTTALLINA Cpr. MS.

Loricâ elongatâ, valvis antice projectis; mucro posticus, elevatus; laminæ acutæ, lævos, (nisi v. post.) elongatæ; v. centrales bifissatæ; sinus haud laminatus, planatus; zonâ spinosâ.

From *Acanthopleura* this genus differs in the smoothness of the sharp teeth, in their great length and Radsioid slitting; in the thrown-back mucro, which often projects beyond the margin; in the throwing forward of the rest of the shell, as in *Katherina*, and in the deep spongy flat sinus which interrupts the sutural laminæ. The name is given in honor of the late Thomas Nuttall, Esq., once professor of natural history at Harvard College, and the original discoverer of the typical species, as well as many others of the shells and plants of California. (Cpr.)

Nuttallina scabra.

Chiton scaber Reeve, Conch. Icon. Mon. Chiton, pl. xvii, f. 106, 1847.
Chiton californicus (Nutt. MS.) according to Carpenter.
Not *Chiton californicus* (Nutt. MS.) according to Reeve.
Acanthopleura scabra Cpr. Suppl. Rep. Br. Assoc. 1863, p. 649.

N. t. mucrone postico, sed haud terminali, maxime trans marginem posticum elevato; v. post. 7–8-, v. ant. 10–11-, centr. 2-fissatis; dent. acutis, lævibus, (nisi postice) prælongis, antice valde projectis; valvis centralibus dent. post. minoribus; subgrundis parvis, haud sulcatis; sinu altissimo, lato, planato, spongioso, haud laminato; zonâ latâ crassâ; spinis testaceis curtioribus densissime obsitâ. Lon. 36, Lat. 10 mm.

Hab.—Vancouver district, south to California, probably in the southern islands of Alaska; at and above high-water mark, in crevices of the rocks; at Monterey abundant.

This singular species, not yet obtained from Alaska, but which will probably be found there, like some Litorinas, seems habitually to prefer positions where it can at most be reached by the spray in storms, on exposed headlands, where the breeze comes in damp and cool from the sea. The pointed valves overlap each other so much that when the creature is curled up they project from the girdle, giving a pectinated outline, unusual in Chitons. The valves are almost always eroded, even the prominent mucro is often hollowed out, and the sculpture can rarely be seen except in young specimens. The color is grayish or brownish, with whitish streaks; the girdle has the aspect of dead brownish-black moss, sometimes with ashy spots at the sutures.

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Order DOCOGLOSSA.

Suborder ABRANCHIATA.

Family LEPETIDÆ.

Genus LEPETA Gray.

Lepeta Gray, P. Z. S. 1847, p. 168.—Dall, Am. J. Conch. v, 1869, p. 140.

Subgenus LEPETA Dall ex Gray.

Lepeta Dall, Mon. Fam. Lepetidæ, Am. J. Conch. v, 1869, p. 141.

Lepeta cæca.

Patella cæca O. F. Müller, Prodr. Zoöl. Dan. 1766, p. 237; Ib. Zoöl. Dan. i, p. 12.

Lepeta cæca Gray, P. Z. S. 1847, p. 168.—Dall, l. c. p. 141, pl. 15, f. 4. (Type.)

Hab.—In Alaska, in 23 fathoms, off the Sea Horse Islands, near Point Barrow, Arctic Ocean north from Bering Strait (Smith! 3 specimens). Elsewhere, northern seas of Europe and Eastern North America generally, 10–100 fathoms (Sars); Massachusetts Bay northward, in America. In Europe northward from Danish waters; on the Norwegian coast; the Hebrides, etc.

This species has not been found, though reported, erroneously, south from Bering Strait on the Pacific side. Such references refer to *L.* (*C.*) *concentrica.* Jeffreys found it in six hundred and ninety fathoms off Holsteinborg in Greenland, and it ranges from that depth to a few fathoms. That it has a curved, nearly spiral, deciduous nucleus when very young, was announced by me in 1869, and is confirmed by Dr. Jeffreys in his Report on the Mollusca of the Valorous Expedition. It is the *Patella candida* of Couthouy, *P. cerea* of Möller, and probably the *Lepeta Franklini* of Gray MSS.

Subgenus CRYPTOBRANCHIA Dall ex Midd.

Cryptobranchia Midd. (pars), Sib. Reise, p. 183, 1851.—Dall, Mon. Lepetidæ, l. c. 1869, p. 143.

The name *Cryptobranchia* was previously used by Gray, Fleming, and Deshayes for different groups of mollusks of family or greater value, but has in none of these cases been used or adopted by other naturalists, and hence was not preoccupied for the group of Middendorf.

Cryptobranchia concentrica.

Patella (Cryptobranchia) cæca, var. *β concentrica*, Midd. Sib. Reise, p. 183, pl. xvi, f. 6, 1851.

Cryptobranchia concentrica Dall, l. c. p. 143, pl. 15, f. 2 *a–f.*

Lepeta cæcoides Cpr. Suppl. Rep. Br. As. 1863, pp. 603, 651.

Hab.—North Japan, Stimpson! Schrenck!, eastward throughout the Aleutians, along the southern coast of Alaska (Dall!), British Columbia

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(Fisher!) to Puget Sound, W. T. (Swan and Kennerly!). Abundant from low water to eighty fathoms on stones and shells, sometimes attaining the length of an inch, but usually about four-tenths of an inch long. Five hundred and twenty-seven specimens examined.

This is the largest and most abundant species of the family. In it, beside differences in dentition, the apex is simply pointed or blunt, not deciduous, as in the typical *Lepeta*. The sculpture is usually faint, but sometimes raised in beautiful concentric frills, from which the name was derived. Small specimens from slight examination have been quoted as *L. cæca* by authors. It has not yet been found north of the Aleutians.

C. concentrica var. **instabilis.**

? *Cryptobranchia instabilis* Dall, l. c. p. 145, pl. 15, f. 6.

I am now convinced that the provisional name which I applied to this singular form is only of varietal value. It seems, from later specimens, to be a form which, from living on the stalk of *Nereocystis*, has become peculiarly arcuated and greatly thickened, much like *Acmæa instabilis*, which has the same habit. It has only been found at Sitka in small numbers, dead, in 10–15 fathoms.

Cryptobranchia alba.

C. alba Dall, l. c. p. 145, pl. 15, f. 3 *a–d*, 1869.

Hab.—Plover Bay, E. Sib., Dall! Seniavine Straits, Stimpson! Akutan Pass, Aleutian Islands, Dall! Dead on beach. Alive at sixteen fathoms, gravel. Twenty-four specimens examined.

This species appears to fill the gap between the distribution of *L. cæca* and *C. concentrica*. It is easily distinguished from the latter by its smooth surface and rounded apex and back, beside anatomical characters. It rarely reaches nearly an inch in length, and is of the purest whiteness.

Extra-limital Species.

Subgenus PILIDIUM Forbes.

Pilidium Forbes, Athenæum, Oct. 6, 1849, p. 1018.—Forbes & Hanley, Brit. Moll. ii, p. 440, 1849; not of Middendorf, Sib. Reise, p. 214, 1851.—Dall, l. c. 1869 (synonymy, etc., in full).
Iothia Gray, not Forbes, 1854 (cf. Dall, l. c. 1869).
Tectura Jeffreys, 1865, not of Gray (1847), nor of authors.
Scutellina Chenu (pars), Sars, not of Gray, 1847.

Pilidium fulvum.

Patella fulva O. F. Müller, Prodr. Zool. Dan. p. 227, 1776.
Pilidium fulvum Forbes, Athenæum, l. c. Oct. 6, 1849.—Dall, l. c. 1869.
Pilidium rubellum Stm. Checklist Sh. N. Am. E. Coast, No. 312, 1865.
Tectura fulva Jeffreys, Br. Conch. iii, p. 250, 1865.
Patella forbesii J. Smith, Wern. Soc. Mem. viii, p. 107, pl. ii, f. 3.
Scutellina fulva G. O. Sars, Moll. Reg. Arct. Norv. p. 122, 1878.

Hab.—Northern and Arctic seas of Eastern America and Europe; doubtfully reported from the Adriatic, where, if it be correctly identified,

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it is probably the remnant of a polar colony, like that in the Gulf of Lyons. It ranges from five to one hundred and fifty fathoms.

This species, like *Cryptobranchia*, has a rounded non-spiral apex. When the Arctic shores of Alaska are more carefully searched, it may turn up there; but it does not seem to be a common species anywhere.

The name *Pilidium* has been used for a stage in the larva of certain invertebrates, but not as having an assured standing in systematic nomenclature. I see no reason, therefore, why it should be replaced by any other. It is hardly necessary to point out that it does not belong even to the same family as the *Tectura* of most authors, though erroneously called *Tectura* by Adams and others. It was sent by Mörch, under the name of *Patella rubella* Fabr., to Dr. Stimpson, which led him and the writer to erroneously unite that species (which is an *Acmæa*) with the present one in 1865 and 1869. To Prof. Sars is due the credit of pointing out the true place of the *P. rubella*. Clark speaks of finding the fry entangled in the mucus of the foot, but this can hardly be more than an accident.

Suborder PROTEOBRANCHIATA.

Family ACMÆIDÆ Cpr.

Acmæidæ Dall, l. c. p. 237, 1871.

Genus ACMÆA Eschscholtz.

Acmæa Esch. Appendix to Kotzebue's New Voyage around the World (Dorpat, 1828), London reprint, vol. ii, p. 350, 1830.—Dall, l. c. p. 237, 1871. Type *A. mitra*.

Having shown by evidence which cannot be successfully controverted, that the name of *Acmæa* has precedence in time of application over *Tecture* Aud. (*Tectura* Gray), no apology is necessary for following the lead of Forbes, Woodward, Hanley, Philippi, and Carpenter, in adopting the prior designation. Its very extensive synonymy will be found in my paper above quoted.

Subgenus ACMÆA Dall ex Eschscholtz.

Acmæa Dall, Am. J. Conch. vi, p. 241, 1871. Type *A. mitra* Esch.
Erginus Jeffreys, Ann. Mag. Nat. Hist. Mar. 1877, p. 231.
Tectura Sars, Moll. Reg. Arct. Norv. p. 121, 1878.

Acmæa mitra.

A. mitra (Esch.) Rathke, Zool. Atlas, v, p. 18, No. 1, pl. xxiii, f. 4, 1833.—Dall, l. c. p. 241, 1871, pl. 14, f. 1.

Hab.—Pribiloff Islands, Bering Sea, westward to Kyska in the Aleutians, and eastward and southward to Sitka, Oregon, and the coast of

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California as far south as the Santa Barbara Islands, from low-water mark to eighty fathoms, Dall! Seventy-four specimens examined.

I showed in 1871 that this species has nothing in common with the genus *Scurria*, to which it has often been referred, except a very superficial resemblance of form of the shell. It is not very abundant anywhere. The partially striated variety *tenuisculpta* Cpr. has not been found in Alaska. *A. mitra* varies from white to pink or green, and is frequently covered with regular nodules or papillæ of nullipore, when it is *A. mammillata* of Eschscholtz. It is the most unmistakable shell of the genus, the members of the restricted subgenus *Acmæa* presenting a singular contrast with one another in respect to their shelly covering.

Acmæa insessa.

Patella insessa Hinds, An. Nat. Hist. x, p. 82, pl. vi, f. 3.
Acmæa insessa Dall, l. c. p. 244, pl. 14, f. 3.

Hab.—Sitka Harbor (one specimen), southward to San Diego, California, Dall! Thirty specimens, mostly from the beaches. It seems very rare in Alaska.

Acmæa instabilis.

Patella instabilis Gould, Proc. Boston Soc. Nat. Hist. ii, p. 150, 1846.
Acmæa (?) *instabilis* Dall, l. c. p. 245.

Hab.—Sitka, Fort Wrangell, very rare; southward to Vancouver (abundant), and Monterey, Cal. (rare); dead on beaches.

This species, like the last, lives on the stems of the giant fuci common to this coast, and I have never seen a fresh specimen with the soft parts. But a radula extracted from one by Mr. H. Hemphill, and kindly sent to me, enables me to say with confidence that it is a typical *Acmæa*.

Extra-limital Species.

Acmæa rubella.

Patella rubella Fabr. Fauna Grönl. p. 386, 1780.
Pilidium fulvum (pars) Dall, Am. J. Conch. v, part iii, 1869.
Tectura (*Erginus*) *rubella* Jeffreys, Ann. Mag. Nat. Hist. p. 231, Mar. 1877.
Tectura rubella G. O. Sars, l. c. p. 121, pl. 8, f. 5 *a–b*, pl. ii, f. 11, 1878.

Hab.—Greenland, Fabr., Möller, Jeffreys; Norway, in Finmark, Sars; 5 to 40 fathoms.

The shell is generally of a much more brilliant orange color than the *Pilidium*, with which it has been confounded. I am not sure that some very young and minute specimens of Limpets found in the Aleutian Islands may not belong to this species, but they are too small to determine their relations with any certainty.

It is unfortunate that Prof. Sars, while recognizing in part the characters which I used to separate this subgenus from *Collisella* in the genus *Acmæa* in 1871, should have applied the name *Tectura* to the true Acmæas, and used *Acmæa* for *Collisella*, in his very valuable work on the Arctic Mollusks of Norway; thus exactly reversing the original arrangement and inadvertently transgressing the laws of nomenclature.

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Acmæa virginea.

Patella virginea Müller, Prodr. Zool. Dan. p. 237, 1776.
Acmæa virginea Hanley, Br. Marine Conch. p. xxxii, 1844.
Tectura virginea of authors.
Acmæa virginea Dall, Am. J. Conch. vi, p. 243, 1871, q. v.

This species extends from Iceland and Northern Norway south to the Azores, but does not reach the shores of America. It ranges from low-water mark to sixty fathoms. The *Ancylus Gussoni* of Costa, which has been united with this species, belongs to the *Siphonariidæ*.

Subgenus COLLISELLA Dall.

Collisella Dall, Proc. Bost. Soc. Nat. Hist. Feb. 1871. (*Acmæa pelta* Esch.)
Acmæa Sars, Moll. Reg. Arct. Norv. p. 120, 1878.

This group is distinguished by slight but constant external differences and by dental characters from the typical Acmæas. It comprises most of the Alaskan species as well as many from other parts of the world.

Acmæa (Collisella) pelta.

A. pelta Esch. Rathke, Zool. Atlas, v, p. 19, 1833.—Dall, l. c. p. 246, pl. 14, f. 6, 1871.
Tectura cassis von Martens, Malak. Blätt. xix, p. 92, pl. 3, f. 9–10, 1872.

Hab.—Aleutian Islands and the southern coast of Alaska south and east to the Santa Barbara Islands, Cal., between or near tide-marks. Five hundred and ninety specimens examined from my own collection and many thousands in the field.

The numerous names which the variations of this species have received, and some account of its varietal forms, have been given by me in the paper alluded to. Only one of these forms, *A. pelta* var. *nacelloides* D. (l. c.) seems sufficiently constant to deserve a separate name. In the examination of hundreds of these most variable shells, one's notions of the characters sufficient among them to constitute a species or variety become so enlarged as to receive little sympathy from those who know the group in question from a few specimens on a museum tablet. Constant field and museum experience for more than twelve years has only confirmed my conviction of the propriety of the views of Dr. Carpenter, on the west coast species, which have been expressed in his various publications. It is true that in selecting from simultaneously published names, if he had known at first all that we now know, perhaps a different selection might have seemed more judicious; but I agree with Dr. v. Martens that any change, now that those selections have become history, would be most objectionable, and not to be countenanced.

The strongly ribbed variety of *A. pelta*, which Dr. v. Martens has so well figured, and has identified with the *cassis* of the Zool. Atlas, appears to be the same. However, the Martensian shell (which I have represented by some magnificent examples) is so closely connected, specimen by specimen, with others nearly smooth, that I cannot admit that it requires or should receive a separate name, even if the identity were

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proven. Other varieties, almost without number, might be selected from the series before me, which taken singly seem quite as distinct, and it seems preferable to err, if at all, in the matter of naming mere variations, on the side of conservatism.

Acmæa (Collisella) persona.

Acmæa persona Eschscholtz, Rathke, l. c. p. 20, pl. xxiv, f. 1-2, 1833.—Dall, l. c. p. 250, pl. 14, f. 8.
Tectura digitalis von Martens, l. c. p. 93, t. 3, f. 3-4.
Tectura persona Ib. l. c. p. 95, f. 5, 6.

Hab.—Adakh Id., Aleutians (one specimen), Shumagins, Cook's Inlet (Martens), Port Etches, and southward to California as far as the Santa Barbara Islands, between and sometimes above tide-marks. One hundred and twenty-eight specimens collected.

The varieties of this shell are often very beautiful, and, taken by themselves, apparently well marked; but in a large series these differences disappear in the general interchange of characters in a way which is impossible to fully realize without a very large series. The synonymy will be found in my paper above cited, and contains several variations much more striking than those separated by von Martens.

Acmæa (Collisella) testudinalis.

Patella testudinalis Müll. Prodr. Zool. Dan. p. 237, 1766.
Collisella t. Dall, l. c. p. 249, pl. 14, f. 13, 1871.

This well-known form was supposed by me to be pretty easily separable from *C. patina* Esch. in 1871, but the result of several years' additional study of the region about the Aleutian Islands has rudely shaken that cherished belief. There is a pretty constant difference in the relative size and proportion of the teeth on the radula of large and fully grown specimens; but of other characters (with seven hundred and thirty specimens before me of all sizes, ages, and localities) I find it impossible to formulate any. Dr. Carpenter at one time thought them distinct, but a re-examination by him resulted in his confessing his inability to distinguish one species from the other by the shells, and I can confidently assert that the exterior of the animals affords no characters whatever. Indeed, some of the varieties of what we have called typical *patina* are more different from the type than *testudinalis* can possibly claim to be. Specimens of adult *patina* from Sitka and the Aleutian Islands are indistinguishable from specimens of *testudinalis* of the same size from Eastport, Maine. It has been found impossible to rightly assort a mixed lot by every one who has tried it. I am therefore forced to divide the species as follows:

Collisella testudinalis var. testudinalis.

Hab.—In Alaska from the Arctic Ocean southward (on both sides of Bering Sea) to Sitka. On the eastern coast of America from Long Island Sound to the Arctic Ocean, Cumberland Gulf (Kumlein), and South Greenland. In Europe, it extends from the English Channel

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northward to Finmark. In Asia, according to Schrenck, it reaches Yesso and the Tartarian coast. "Mexico" is quoted, ex B. M. tablet, by Jeffreys; of course due to ballast or some mixture of specimens or labels. North of the Pribiloff group, in Bering Sea, it appears to be the sole form of the genus.

C. testudinalis var. **patina.**

Acmæa patina Esch. Rathke, l. c. p. 19, pl. xxiv, f. 7–8, 1833.
C. patina var. *normalis* sive *pintadina* (Gld.) Dall, l. c. p. 247, pl. 14, f. 4, 1871.
Tectura patina Martens, l. c. p. 93, pl. 3, f. 7–8, 1872.

Hab.—Aleutian Islands, eastward and southward on the Alaskan side to San Diego, California. Six fathoms to high-water mark; usually between tides.

The characters assigned to *patina* by most naturalists are those of southern specimens (which were described as *Patella pintadina* by Gould), nineteen-twentieths of the specimens in museums having come from California.

In northern waters these distinctions are more or less obsolete, but on a comparison of Californian with Massachusetts Bay specimens it is very easy to draw the line between them, and this holds good for individuals as far as the Aleutians, but not for the generality.

C. testudinalis var. **alveus.**

Hab.—Sitka northward and elsewhere with the typical form in Atlantic seas, a variety formed the residence of the individual on a narrow frond of seaweed or *Zostera*. *Tectura alveus* of authors.

C. testudinalis var. **Cumingii.**

Patella Cumingii Reeve; Dall, l. c. p. 248.

Hab.—From the Pribiloff Islands southward with var. *patina*. Commonest toward Cook's Inlet, rare at the northern extreme of range and southward of Vancouver Island. Usually near low-water mark, and most frequently in isolated rocks washed by the surf.

C. testudinalis var. **ochracea.**

Dall, l. c. as var. *patinæ*, p. 249, pl. 17, f. 35.

Hitherto found chiefly in California, but reported from Vancouver Island by Hepburn; rare.

My largest specimen of var. *patina* is two and three-quarters inches long; another is an inch high. Every imaginable fluctuation in color, elevation, smoothness or striation, width in proportion to length, &c., may be found somewhere in the series before me. Yet, after uniting *patina* to the older form, there is a certain *facies* which distinguishes the species from any other with tolerable readiness. It is the commonest of all the species in Alaska and over the whole northwest coast of America.

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Acmæa (Collisella) peramabilis.

A. peramabilis Dall, Proc. Cal. Acad. Sci. iv, p. 302, Dec. 1872.

Hab.—Shumagin Islands, low water to six fathoms. Six specimens.

This most lovely species is most like some reddish varieties of *patina*, but none of them approach it in color, while numerous other features testify to its distinctness; which I have, as yet, seen no reason to doubt. It appears to be exceedingly local and rare, but all the specimens present a very uniform appearance.

Acmæa (Collisella) sybaritica.

Collisella sybaritica Dall, Am. J. Conch. l. c. vi, p. 257, pl. 17, f. 34 *a–c*, 1871.

Hab.—Pribiloff Islands southward on the west to Hakodadi, Japan (Stm.!), throughout the Aleutians, and on the southeast to Chirikoff Island, and perhaps Kadiak; from lowest water to twenty-five fathoms. One hundred and ninety specimens examined.

This beautiful little species, of which only a few specimens were known when it was described, has since been found over a very large area, and usually in rather deep water for the genus. It seems to represent *Acmæa virginea* on the Pacific side, though not very similar to it in appearance. The largest specimen found is an inch in length, but they are always very much flattened.

Acmæa (Collisella?) triangularis.

Nacella (*?paleacea* var.) *triangularis* Cpr. Proc. Cal. Acad. Sci. iii, p. 213, 1866.
Collisella? triangularis Dall, l. c. p. 254, 1871.

Hab.—Sitka to Monterey, Cal.; dead on beaches.

This species varies from narrow, high, and elongated to rounded and rather flat, according to the place of its growth, as on a frond or leaf of some marine plant like *Zostera*, or on a flat unlimited surface. It appears very rare in Alaska, only one specimen having been collected there, but is tolerably common on the coast of California. I have never, however, been able to get it in the living state, so as to definitely decide its generic place.

Acmæa (Collisella?) apicina n. s.

Testâ parvâ, conicâ, tenui, rotundatâ, plus minusve elevatâ; albidâ seu isabellina, apice erecto, luteo; intus luteo, albido, seu fusco, lævi; extus striulis incrementis subobsoletis munito. Lat. 5 mm., Lon. 6 mm., Alt. 4 mm.

Hab.—Pribiloff Islands on the north, the Aleutians from Amchitka eastward, extending to the Shumagins; twenty-two specimens, all dead except two, one of which was found at low water and the other dredged in seventy fathoms.

Among other small shells obtained from time to time on the beach or in the dredge, occasional specimens occurred which at first were supposed to be the young of *A. mitra* or pale specimens of *A. sybaritica*.

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After eliminating some of these, there remained, after careful study, a residue, which do not appear to coincide in character with any described species. They are small, thin, conical, with a blunt, erect apex marked by a light yellow spot, the rest of the exterior white or faintly yellowish, marked by obsolete lines of growth, smooth, or nearly so, but not polished. Within, fresh specimens are yellowish, whitish, or orange-colored, and quite polished. The outside is almost always covered with nullipore. The chief characters are the rounded base, regularly conical and yellow spotted apex, with a thinner shell than young *A. mitra*.

Fam. PATELLIDÆ.

Genus NACELLA Schumacher.

Nacella (Schum.) Dall, l. c. p. 274, 1871. Type *N. mytilina* Gm.

Nacella? rosea.

Nacella? rosea Dall, Proc. Cal. Acad. Sci. iv, p. 270, pl. 1, f. 2, Oct. 1872.

Hab.—Dead on exposed ocean beaches at Kyska Island, Aleutians, and Simeonoff Island, Shumagins. Alive on fuci off shore? Forty-five specimens obtained, all dead.

This exquisite little rose-leaf of a shell exactly resembles the type of the genus *Nacella* in form, and is the only one of the so-called *Nacellæ* of the northwest coast which has not been proved to be an Acmæid. It is only provisionally referred to this family, and may prove, like the others, non-patelloid when the animal becomes known.

In this connection it may be of interest to quote the words of Eschscholtz in describing the genus *Acmæa*,* words which at one time were partially discredited, but which the march of science has proved literally true:—"Here" (at Sitka) are found "six species of a genus which from its simple unwound shell would be immediately taken for a *Patella;* the creature, however, closely resembles the *Fissurella*, with the difference that only one gill is visible in the fissure over the neck. It is remarkable that on the whole northwest coast of America, down to California, no *Patella*, only animals of the genus *Acmæa* were to be met with."

It will be noticed from the preceding documents that in the Alaskan region fourteen species of Limpets, not counting the innumerable varieties, and twenty-six or seven species of *Chitonidæ*, are known, most of which have rewarded our researches, and a part of which are absolutely new. Additional species may be expected to recompense additional and more minute research; but that the chief members of these groups native to this region have been determined there is little reason to doubt.

* From the English reprint, published in the spring of 1830, but dated by the author at "Dorpat, Jan. 7, 1828." I found the first edition in the Royal Library at Stockholm. It passed the censor in March, 1829, was issued in the winter of 1829-30, and is dated on the titlepage 1830.

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Extra-limital Species.

Genus PATELLA Linné.

Patella Lin. S. N. ed. x, 1758.—Dall, l. c. p. 266, 1871 (full synonymy).

Patella vulgata.

P. vulgata Lin. Syst. Nat. ed. xii, p. 1258.—Dall, l. c. p. 268, pl. 15, f. 23, 1861.

British and North European seas from the Mediterranean to the Northern Lofoten Islands, between tides. Type of the genus.

Genus PATINA Leach.

Patina Leach, MSS. 1819; Moll. Gt. Brit. 1852, p. 223.—Dall, l. c. p. 279.
Helcion Jeffreys, not Montfort.
Nacella H. & A. Adams, Sars, not Schumacher.

Patina pellucida.

Patella pellucida Lin. S. N. ed. xii, p. 1260.
Patina pellucida Leach, l. c. p. 224, 1852.—Dall, l. c. p. 280, pl. 16, f. 20, 1871.

British and North European seas, northward to Lofoten; in most cases living on the stalks and fronds of large fuci.

DECEMBER 16, 1878.

LIST OF THE FIGURES.

PLATE I.

1. *Leptochiton cancellatus* Sby., Alaska: *a*, major lateral from above.
2. *Hanleyia mendicaria* Mighels & Adams, Casco Bay, Maine.
3. *Trachydermon ruber* Lowe, Greenland: *a*, major uncinus from below.
4. *Trachydermon albus* Lin., Alaska.
5. *Tonicella lineata* Wood, Alaska.
6. *T. marmorea* Fabr., Greenland.
7. *T. submarmorea* Midd., Alaska.
8. *Schizoplax Brandtii* Midd., Aleutian Islands.
9. *Chætopleura gemma* Cpr., California.
10. *C. ? Hartwegii* Cpr., California.

PLATE II.

11. *Maugerella conspicua* Cpr., California.
12. *Stenoradsia magdalenensis* Hinds, California.
13. *Stenoplax limaciformis* Sby., west coast of Mexico.
14. *Ischnochiton regularis* Cpr., California.
15. *Ischnochiton Cooperi* Cpr., California.
16. *Ischnochiton interstinctus* Gld., Alaska.
17. *Ischnoradsia trifida* Cpr., Alaska: *a*, cusp of major lateral from above.
18. *Lepidopleurus Mertensii* Midd., Alaska: *a*, rhachidian *in situ*.
19. *Lepidoradsia australis* Sby., Port Jackson, Australia.
20. *Callistochiton palmulatus* Cpr., California.

PLATE III.

21. *Pallochiton lanuginosus* Cpr., California.
22. *Chiton articulatus* Sby.: *a*, side view of rhachidian tooth.
23. *Ischnoplax pectinatus* Sby., West Indies.

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24. *Chiton Stokesii* Brod., Peru: *a*, major uncinus from below.
25. *Chiton Cumingii* Frembly, Chili.
26. *Chiton assimilis* Reeve, West Indies.
27. *Tonicia elegans* Frembly, Chili.
28. *Acanthopleura spinigera* Sby., Aden.
29. *Lucia confossa* Gld., Patagonia: *a*, minor lateral; *b*, major uncinus.
30. *Corephium echinatum* Sby., South America.

PLATE IV.

31. *Nuttallina scabra* Reeve, California.
32. *Phacellopleura porphyritica* Reeve.
33. *Placiphora Carmichaelis* Gray, South America.
34. *Mopalia Wossnesscnskii* Midd., Alaska.
35. *Mopalia ciliata* Sby., Alaska: *a*, minor lateral.
36. *Placiphorella velata* Cpr., California: *a*, minor lateral from inner side.
37. *Katherina tunicata* Wood, Alaska.
38. *Acanthochiton avicula* Cpr., California.
39. *Acanthochiton spiculosus* Rve., West Indies.
40. *Macandrellus* (*costatus?* Ad. & Angas), Australia.

PLATE V.

41. *Cryptoconchus monticularis* Quoy, New Zealand.
42. *Amicula Pallasii* Midd., Alaska.
43. *Amicula vestita* Sowerby, Massachusetts Bay. (*Emersonii* Couth.)
44. *Cryptochiton Stelleri* Midd., Alaska.
45. *Chitonellus fasciatus* Quoy, Gaspar Straits: *a*, minor lateral from outer side.
46. View of the anterior end of a Chiton from below: *a*, muzzle; *b*, veil; *c*, fringe or true mantle-edge; *d*, lower surface of girdle; *e*, end of row of "ambient" branchiæ; *f*, lower surface of foot.
47. Developement of larval Chiton, *Trachydermon cinereus* Lowe (*T. marginatus* Jeffreys), after Lovén: *a*, embryo, in the egg; *b*, dorsal view of larva, showing the commencement of the grooves for the valves; *c*, lateral view of the same; *d*, larva further advanced, the valves beginning to be formed; *e*, the same, from beneath, showing the foot and eyes at the sides of the head; *f*, dorsal view of an older individual, showing the diminished size of the anterior tuberculate lobe or head.

NOTE.—The figures of dentition are diagrams, not portraits, designed to indicate the form of the individual teeth rather than the superficial appearance of the undisturbed radula. While the photographic relief process, by which these plates were obtained from the original drawings, has not been as satisfactory in its results as was at first hoped, it is believed that, inartistic as they may appear, the figures are more characteristic than if they had been redrawn and subjected to the artistic modifications of a professional draughtsman unacquainted with the subject.

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ON THE IDENTITY OF EUCHALARODUS PUTNAMI, GILL, WITH PLEURONECTES GLABER, (STORER) GILL, WITH NOTES ON THE HABITS OF THE SPECIES.

By TARLETON H. BEAN.

In October, 1864, Prof. Gill described a remarkable new genus of pleuronectoids under the name of *Euchalarodus*,* from specimens sent to him from Salem, Massachusetts, by Prof. F. W. Putnam, which has ever since been considered an anomaly among flat-fishes. *Euchalarodus Putnami* is little known except through the excellent description of its founder, the few specimens collected being shared by only two museums—that of the Peabody Academy, Salem, and the U. S. National Museum. In contrasting *Euchalarodus* with other American genera of Pleuronectinæ, Prof. Gill says:† "From the American genera *Pseudopleuronectes*, Blkr., *Liopsetta*,[‡] Gill, *Myzopsetta*, Gill, and *Limanda*, Gottsche, it is at least distinguished by its squamation, oculo-scapular ridge, nostrils, dentition and structure of the dorsal and anal fins. It is most nearly related to Pleuronectes,[§] with which it agrees in the free tongue, but the more perfect union and the triangular form of the wholly united lower pharyngeal bones, the want of an anal spine, and, above all, the movable teeth and scarcely perforate anterior nasal tubes will especially distinguish it, not only from that genus, but from any other known one. So anomalous indeed are the characters of dentition and nostrils, that only after I had felt each tooth could I be convinced that they were really normally movable, and that the condition was not the effect of disease, an idea which, improbable as it was, occurred to me. The remaining genera of the subfamily of Pleuronectinæ—*Platichthys*, Grd., *Parophrys*, Grd., *Lepidopsetta*, Gill, *Glyptocephalus*, Gottsche, *Microstomus*, Gottsche, *Pleuronichthys*, Grd., *Hypsopsetta*, Gill, *Heteroprosopon*, Blkr., and *Clidoderma*, Blkr.—are equally or still more distinct than those already mentioned."

From the above and from an examination of the types it is evident that we should compare *Euchalarodus* with *Pleuronectes*. This I have done, employing for the purpose the types of the description of *Euchalarodus Putnami*, Gill, and specimens of *Pleuronectes glaber*, (Storer) Gill, and *Pleuronectes platessa*, Linn. My investigations force me to the conclusion that these are all members of one and the same genus, *Pleuronectes*, since they possess in common the characters of that genus as defined by Bleeker, as well as those by which *Euchalarodus* was differentiated from *Pleuronectes*. *Euchalarodus*, by the way, *has* an anal spine.

* Proc. Acad. Nat. Sci. Philad. 1864, pp. 221 and 222.

† Op. cit. p. 222.

[‡] The *Platessa glabra* of Storer, for the accommodation of which this genus was proposed, has since been referred to the genus *Pleuronectes* (Art.) Bleeker, by Prof. Gill.

[§] *Pleuronectes* (Art.) Bleeker, Verslagen en Mededeelingen der koninklijke Akademie van Wetenschappen, Deel xiii, Amsterdam, 1862, pp. 427, 428.

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Take the most salient characters of the genus *Euchalarodus*—the movable teeth and scarcely perforate anterior nasal tubes—the same conditions may be observed in *Pleuronectes glaber* and *P. platessa*. *Euchalarodus Putnami*, in fact, is the male of *Pleuronectes glaber*, and differs from it only in having more of its scales ciliated. The young are like the adult male in this respect. Had all the examples of *Pleuronectes platessa* exhibited movable teeth, it would have led to the belief that *Euchalarodus* after all might be applied to the species of *Pleuronectes* with movable teeth, but one of them has the teeth firmly fixed, another has some in the upper jaw movable, and a third has all the teeth reclining and freely movable. The explanation of this condition is yet to be sought.

The materials used in this examination are as follows:

5368.	Types (2) of *Euchalarodus Putnami*.		Salem, Mass.	Putnam.	(Teeth of larger movable.)
20910.	*Pleuronectes glaber*, ♂.		Portland, Me.	Tarleton H. Bean.	(Teeth movable.)
20920.	,,	,,	♂ and ♀.	Salem, Mass.	C. F. Putnam.	(Teeth movable.)
20954.	,,	,,	(7 young*).	Bucksport, Me.	C. G. Atkins.	(Teeth fixed.)
14657.	,,	,,	(half-grown).	Portland, Me.	Summer, 1872.	(Teeth fixed.)
14659.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14662.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14666.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14667.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14669.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14673.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14677.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14678.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14679.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14681.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14682.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14683.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14684.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14685.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14658.	,,	,,	(adult ♀).	,,	,,	,,	,,	,,
14661.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14663.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14664.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14665.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14671.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14672.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
14674.	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
20873.	,,	,,	(1 ♂ and 2 ♀).	,,	,,	Dec. 15, 1877.	(Teeth movable.)
20954.	,,	,,	(3 spent ♀).	Bucksport, Me.	Mar. 4, 1878.	(Teeth transitional.)

It will be seen that the teeth of the adult male and female are freely movable only during the breeding season, and that those of the young are fixed.

10029.	*Pleuronectes platessa*.		Kiel.	Dr. Möbius.	(Teeth fixed.)
10061.	,,	,,	Christiania, Norway.	R. Collett.	(Teeth movable.)
21175.	,,	,,	France.	Mus. d'Hist. Nat. Paris.	(Some teeth of upper jaw movable.)

*The longest of these is 140mm in length. All have rough scales.

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As before remarked, *Euchalarodus Putnami* is not even specifically distinct from *Pleuronectes glaber*, a species well distinguished from *Pleuronectes platessa* by its more continuous and pronounced oculo-scapular ridge, its radial formula, and other characters. The synonymy of *Pleuronectes glaber* is as follows:

Pleuronectes glaber, (Storer) Gill.

Platessa glabra, STORER, Proc. Bost. Soc. Nat. Hist. i, 1843, p. 130; Mem. Amer. Acad. viii, 393, pl. xxxi, fig. 1; Hist. Fishes Mass. 1867, p. 199, pl. xxxi, fig. 1. —PUTNAM, Bull. Essex Inst. vi, 1874, p. 12.

Liopsetta glabra, GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

Pleuronectes glaber, GILL, in Rep. U. S. Com. Fish and Fisheries, 1873, p. 794.—GOODE & BEAN, Amer. Jour. Sci. and Arts, xiv, 1877, p. 476; xvii, Jan. 1879, p. 40.

Euchalarodus Putnami, GILL, Proc. Acad. Nat. Sci. Phila. 1864, pp. 216 and 221; in Rep. U. S. Com. Fish and Fisheries, 1873, p. 794.—PUTNAM, in Storer, Hist. Fish. Mass. 1867, p. 279.—GOODE & BEAN, Amer. Jour. Sci. and Arts, xiv, Dec. 1877.

The smooth plaice, *Pleuronectes glaber*, (Storer) Gill, was described by Storer from the coast of Massachusetts. Specimens from Salem Harbor, November 15, 1872, are in the Museum of Peabody Academy. The U. S. Fish Commission found it very abundant, during the summer of 1872, in Bluelight Cove, Casco Bay, Maine, and they seined the young at Salem in August, 1877. Mr. C. A. Putnam of Salem took specimens at Beverly Bridge in January, 1858,—the specimens which formed the types of *Euchalarodus Putnami*. I add the following from my notes:

December 15, 1877, ten specimens were found among the flat-fishes (*Pseudopleuronectes americanus*) in Washington Market, which had come from Portland, Me., by way of Fulton Market, New York. Nine of these were gravid females, and one was a male, which was smaller than the average of the females, and had rougher scales.

December 18, 1877, thirteen specimens were again taken from among the flat-fishes, nearly all of them from one stand. All were females, most of them gravid. The weight of the largest was 23 ounces avoirdupois; of its spawn, 7 ounces. The ovary of the blind side extended from the origin of the ventral to the end of anal (7¼ inches). The ovary of the eyed side was 6$\frac{3}{10}$ inches long. The eggs were one-thirtieth of an inch in diameter. The length of the fish was 13½ inches. The smallest of the thirteen weighed 3¾ ounces, and contained eggs about as large as those of the preceding. There is considerable variation in the extent of the ventrals.

January 10, 1878, two fresh specimens were received through Mr. C. F. Putnam, from Salem, Mass., a male and a gravid female. The weight of the male is 5 ounces; of the female, 21. They are called "fool-fish" in Salem, because they will bite even at a rag. It is said that they appear about Christmas in numbers, and remain only a short time. They probably come into the harbor to spawn. There is no record of the oc-

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currence of the species farther south than Salem, though from the external resemblance of the male and the young to *Pseudopleuronectes americanus*, it might easily be overlooked. "Christmas-fish" is another name for the smooth plaice at Salem.

U. S. NATIONAL MUSEUM, *December* 31, 1878.

THE IDENTITY OF RHINONEMUS CAUDACUTA (STORER) GILL WITH GADUS CIMBRIUS, LINN.

By G. BROWN GOODE and TARLETON H. BEAN.

In 1848, Dr. David Humphreys Storer described a gadoid fish from Massachusetts Bay, to which he gave the name *Motella caudacuta*.* In 1863, a special genus, *Rhinonemus*,† was framed for it by Professor Gill, and the species has since been called *Rhinonemus caudacuta* (Storer) Gill. After a critical examination of European and American specimens, we are convinced that this species is separated by no valid characters from that described by Linnæus under the name *Gadus cimbrius*.‡ A specimen of the latter in the National Museum from Christiania, Norway (No. 10058, R. Collett), agrees precisely with specimens of *R. caudacuta*, so-called, from Massachusetts Bay (collected in 1877 and 1878 by the U. S. Fish Commission), in proportions of body and fins, shape of head, numbers of fin-rays, and coloration. The radial formula is misstated by Storer, who gives it D. 53, A. 48, and this evidently misled Professor Gill, who noted that *Rhinonemus caudacuta* was "very closely related to the *Motella cimbria* of Europe," but who evidently had at the time of naming the genus never seen a specimen of the species from either side of the Atlantic. Storer's description of color, cited by Gill as separating his species from that of Linnæus, applies very well to the latter: "the posterior margin of the second dorsal and anal fins, as well as the edge of the caudal fin of a dark slate color."

The radial formulæ of four specimens studied stand as follows:

10058	(Christiania).	D. 50.	A. 44.	P. 16.	V. 5.
21918	(Massachusetts Bay).	D. 49.	A. 43.	P. 16.	V. 5.
21919	(Massachusetts Bay).	D. 51.	A. 44.	P. 16.	V. 5.
21919 *a*	(Massachusetts Bay).	D. 52.	A. 45.	P. 16.	V. 5.

The genus *Motella* was not proposed in proper form until the publication of the second edition of Cuvier's Règne Animal in 1829, although in its French form—*Les Mustèles*—it was applied by Cuvier to the genus in 1817. The name of Risso, published in his "Europe Meridionale" in 1827, must therefore be used as Professor Gill has indicated.§

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* Proc. Bost. Soc. Nat. Hist. iii, 1848, p. 5.

† Proc. Acad. Nat. Sci. Phila. 1863 (Sept.), p. 230.

‡ Systema Naturæ, ed. 12, 1766, p. 440.

§ L. c. p. 241.

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The sole character which separates *Rhinonemus* from *Onos* is the presence of a nasal cirrus, a character to which we are unwilling to allow more than a subgeneric value. We believe that the species should be called *Onos cimbrius* (Linn.), but are willing to accept provisionally the name *Rhinonemus cimbrius*. We have examined numerous specimens which purported to belong to *Ciliata argentata* (Reinh.) Gill, and have found them in every case to be the young of this species, for small individuals of *R. cimbrius* are found swimming at the surface, although the adult fishes inhabit only the deeper parts of Massachusetts Bay. English ichthyologists now regard *Ciliata* as the larval form of "Motella," and if this be not the case, we doubt if this genus has ever been observed in the Western Atlantic. The National Museum has specimens of *Onos mustela* (Linn.), *Onos tricirratus* (Bloch), and *Onos maculatus* (Risso); the specific individuality of the latter two seems very doubtful, as well as that they are distinct from *Onos ensis* (Reinh.) Gill, described from the coast of Greenland.

The synonymy of *Onos cimbrius* is given below.

Onos (Rhinonemus) cimbrius (Linnæus) Goode & Bean.

Gadus cimbrius, LINNÆUS, Syst. Nat. ed. xii, 1766, p. 440.—LACÉPÈDE, Hist. Nat. Poiss. ii, 1801, p. 442.

Motella cimbria, BELL, Canadian Naturalist and Geologist, iv, 1859, p. 209.—GÜNTHER, Cat. Fishes Brit. Mus. iv, 1862, p. 367.—GILL, Proc. Acad. Nat. Sci. Phila. 1863, p. 241.

Enchelyopus cimbricus, SCHNEIDER, Bloch's Systema Ichthyologiæ, 1801, p. 50, pl. ix.

Motella cimbrica, NILSSON, Prodr. Ichth. Scand. p. 48; Skand. Fauna, iv, 1855, p. 587.—YARRELL, Hist. Brit. Fishes, 2d ed. 1841, ii, p. 274.

Motella caudacuta, STORER, Proc. Bost. Soc. Nat. Hist. iii, 1848, p. 5; Mem. Amer. Acad. Sci. 1867, p. 411; Hist. Fishes Mass. 1867, p. 183.

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WASHINGTON, *December* 31, 1878.

CATALOGUE OF THE BIRDS COLLECTED IN MARTINIQUE BY MR. FRED. A. OBER FOR THE SMITHSONIAN INSTITUTION.

By GEORGE N. LAWRENCE.

After completing the exploration of Grenada, Mr. Ober left there the fore part of April and visited the island of Tobago, where he remained for more than two months, and did not arrive in Martinique until the beginning of July, remaining there until the latter part of August. His collection was made "from July 9th to August 20th." It consists of ninety-one specimens.

He gives an interesting account of the island, which, with his other observations, are indicated by quotation-marks.

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"*Sketch of Martinique.*

"Martinique is the largest of the Lesser Antilles, being about 50 miles in length and containing, it is estimated, about 380 square miles.

"The surface is very uneven, the interior being one grand region of hills and mountains. The highest of these is Mount Pelée, northwest of the principal town, St. Pierre, and in the northwestern part of the island. It is over 4,000 feet in height; it is a volcano, and has emitted smoke and ashes within thirty years; now, however, there are no signs of an eruption. There are in all 5 or 6 extinct volcanoes. Here may be seen in great perfection those picturesque *pitons*, or peaked mountains—conical peaks. One group in the interior shows itself in great beauty from Fort de France. Mineral and warm springs occur in various parts of the island, and some of the rivers are of good size.

"To one glancing at a map of the island—with its high mountains, dark ravines, gloomy gorges, tracts of elevated table land, numerous bays and streams—this would seem the promised land for birds. Situated, too, midway the volcanic chain, it should possess birds that no other island could boast. Yet I have found it otherwise, and in Dominica, only 30 miles of latitude further north, I obtained more species and found birds in greater profusion. This is owing to at least two causes—the hand of man being manifest in both—1st, the dense population (the island having a population of not less than 130,000); 2nd, to the thorough cultivation of all cultivable land. From the coast to the hills, and even up the mountain sides, cane is grown; and when that is not practicable, are the provision grounds of the negroes. The rest is pasture land, trees, and rocks. I found great difficulty in getting a place of abode outside the city, and it was a week or two after my arrival before I could get even a floor to sleep upon. There are no hotels outside of St. Pierre and Fort de France, save at the two warm springs, and no inns or hostelries.

"Had it been practicable, I would have made a camp in the mountains; but this I could not do, as I did in Dominica and St. Vincent. Notwithstanding all this, I secured a roof and a room in a little hamlet in the mountains called Morne Ronge, and from there made excursions to Morne Calebasse, Morne Balisier, Mountain Pelée, and Champ Flore. Birds were unusually scarce from the incessant persecution they are subject to from boys and men; later on, after returning to St. Pierre, I went to Fort de France. After losing several days there, I crossed the bay of Fort Royal to Trois Islets—where I had great difficulty in getting shelter. Fortunately I found a host in the proprietor of an estate near Trois Islets; the estate was none other than 'L'habitation de la Pagerie', where the Empress Josephine was born and passed her earlier years.

"Finding lodgings in the negro barracks, and procuring sustenance at the house of my friend the proprietor, I passed some time, obtaining there nearly all the birds that I secured at all in the island.

"Trois Islets is about 20 miles south of St. Pierre, on the Caribbean

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side. From there I scoured the hills and valleys to 'Ance du Diamant' on the southern point, near the famous Diamond Rock, and thoroughly canvassed that historic ground, trodden 100 years ago by the feet of the beautiful Empress of the French. In the *Jardin des Plantes*, in the suburbs of St. Pierre, I had permission to shoot, through the courtesy of the *directeur*, Monsieur Chs. Belanger. But though these gardens are extensive and beautiful, crowded with trees and shrubs of the Tropics, secluded and forbidden to the ordinary *chasseur*, I found very few species and no great numbers of any one species.

"Throughout the island there exists such a dread of the 'serpent', the Iron lance (*Trigonocephalus lanceolatus*), that I found it impossible to obtain a good boy, to assist me in finding the haunts of birds. More than once I have been startled by the cry of 'serpent' and found that my coloured brother had absconded.

"Though at first inclined to believe in the oft-repeated stories of deaths from snakebites, I soon found that the number of serpents was either grossly exaggerated, or they took good care to keep out of my way, for in all my tramps I saw but two large ones.

"There are, however, numerous deaths from these noxious reptiles during the cane season. The serpent prefers the cane fields, where he hunts the numerous rats; and, as my ground for hunting is any but the cane, for birds, this may be the reason we met so seldom. I cannot say that I was anxious to find one, however; though I did not let the possible presence interfere with my regular work.

"My thanks and those of the Institution are due to Capt. W. A. Garfield, U. S. Consul; Monsieur Chs. Belanger, directeur du Jardin des Plantes, and Monsieur Louis Hartmann."

Fam. TURDIDÆ.

1. Margarops herminieri (Lafr.).

"'Grive à pieds jaunes.'

"Rare, owing to the persecution of hunters."

2. Margarops densirostris (Vieill.).

"'Gros Grive.'

"Not common, being the chief bird sought by the hunters in the hunting season, consequently shy."

3. Margarops montanus (Vieill.).

"'Grivette.' Iris yellow.

"Length, ♂, 10 in.; alar extent, 14; wing, 4½.

"Like the same species of Dominica, it prefers the higher hills and mountains, the deep woods and their borders, and detached wood with deep shade. As numerous apparently as in Dominica."

4. Cinclocerthia gutturalis (Lafr.).

"'Trembleur.' Resident.

"Length, ♂, 9½ in.; alar extent, 13; wing, 4¼.

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"This Trembleur, known also as the 'Grive trembleuse', is not found so easily and frequently as in Dominica. This I attribute wholly to the fact that it is pursued here with greater vigor than in the other island. So dense is the population of Martinique, that nearly every bird is considered as fit for food, and anything above a sparrow is classed as game. Even the sparrows, the 'pères noires', are caught with snares and shot with blowguns, by the little negroes of the country. In fact, they would always await my return from an excursion to obtain the mutilated birds that I would discard as useless.

"It is not strange that 'Le Trembleur', with all his queer ways and familiar habits, should now commence to disappear; not many years hence he will not be found in Martinique."

5. Ramphocinclus brachyurus (Vieill.).

"'Gorge blanc.' Iris hazel, in some red.

"Length, ♂, 8¾ in.; alar extent, 12; wing, 4.

"Length, ♀, 8¼ in.; alar extent, 12; wing, 4.

"Obtained several specimens at Trois Islets in August. I saw one also in the Jardin des Plantes, at St. Pierre. Mr. Semper found it in St. Lucia. Not found in the other islands. The first I have seen I shot in this island. It seems confined to Martinique and St. Lucia. Loves deep woods and the borders of streams; is easily attracted by an imitation of its note. That is the reason I am able to record the capture of so many specimens."

Fam. SYLVIIDÆ.

6. Myiadestes genibarbis, Sw.

"'Siffleur Montagne.'

"Length, ♂, 7½ in.; alar extent, 10½; wing, 3½.

"Length, ♀, 7½ in.; alar extent, 11; wing, 3¾.

"The fittest place in which I could have discovered my old favorite of Dominica, was in a charming ravine through which flowed a limpid stream, at 'Champ Flore'. He was clinging to a liane on which grew numerous wild pines, and whistling exactly the same as his Dominica congener.

"From the appearance of the female and from my observations in Dominica I think they breed late."

Fam. TROGLODYTIDÆ.

7. Thryothorus martinicensis, Scl.

"Wren. 'Rossignol.'

"Length, ♂, 5½ in.; alar extent, 7½; wing, 2⅜.

"An inhabitant of the woods; I have not seen it near houses or sugar mills, only in the forests of the hills, and along the borders of streams where the bushes are thick."

Mr. Ober sent but a single specimen of this species: its dimensions are

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somewhat larger than given by Mr. Sclater. Compared with *T. rufescens*, the bill is longer; the color above is duller, being brownish; the under surface is very much paler; in *rufescens* the bands on the tail are more numerous and better defined.

Fam. SYLVICOLIDÆ.

8. Dendrœca rufigula, Baird.

"Yellow Bird. 'L'Oiseau Jaune.'

"Length, ♂, 5 in.; alar extent, 7¼; wing, 2¼.

"Is generally distributed throughout the island. In the old fields once cultivated for cane, and now suffered to return to pasturage, where generally the *guavas* are abundant, this bird will be found, searching about the stems and leaves of the shrub for insects. These same guava bushes are also the chosen hiding places of the venomous spiders—the Tarantula, and many a hairy monster came to grief, while myself and little black assistants were beating the bushes for birds. It is a most thorough exterminator of the small insects of the island."

This species is surely the one referred to *Sylvia ruficapilla*, Lath. (*Motacilla ruficapilla*, Gm.), by Vieillot (Nouv. Dict. xi, 1817, 228), supposing it to be the same. They differ very materially, the entire head and throat being rufous in the Martinique bird, and so described by Vieillot; whereas in *D. ruficapilla*, the crown only is stated to be rufous.

Martinique is the locality given, also, for *D. ruficapilla*, which probably was the cause of Vieillot being misled.

As the name of *ruficapilla* belongs to another species, Prof. Baird (Rev. of Amer. Birds, p. 204) applied to Vieillot's species that of *rufigula*. He then speaks of a specimen in the Museum of the Philadelphia Academy of Sciences, labelled "*S. ruficapilla*," without indication of locality. He says: "It agrees very well, especially in the greater extension of the rufous of the throat, with the *Sylvia ruficapilla* of Vieillot. from Martinique; and it may be really a West Indian species."

Since then, in "North American Birds," p. 217, under *D. rufigula*, there being under examination a bird from Panama, which it was thought might be the species described by Vieillot, he has in a footnote the following remark: "Should Vieillot's species be really from Martinique, in all probability the present bird will be found to be different, and therefore not entitled to the name here given."

It now being established that Martinique is the true patria of this form, Prof. Baird's name of *D. rufigula* must be used for it. The male agrees with the description given by him of Vieillot's species, viz, in having "the rufous of entire head extending down the neck to jugulum." The measurements of the wing and tail are just the same as given by Prof. Baird, *i. e.*, wing, 2.25; tail, 2.

There is but one specimen of the female in Mr. Ober's collection, in

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very poor condition; it has the upper plumage olivaceous, and on the crown is of a rather deeper shade.

9. Setophaga ruticilla (Linn.).

"'*Le Gobe-mouche aurore.*'

"Not often seen."

Fam. VIREONIDÆ.

10. Vireosylvia calidris var. **dominicana**, Lawr.

"'*Quec.*'

Fam. HIRUNDINIDÆ.

11. Progne dominicensis (Gm.).

"Flying above the sea near the cliffs between St. Pierre and Fort de France."

Fam. CŒREBIDÆ.

12. Certhiola martinicana, Reich.

"'*Sucrier.*'

"Length, ♂, 4⅞ in.; alar extent, 7¾; wing, 2½.

"Not so abundant as in Dominica, but in greater numbers than in St. Vincent and Grenada. The Jardin des Plantes, near the city of St. Pierre, is the only place in which I have seen it plentiful. In the trees overhanging the suburbs of the city it is not an infrequent visitor, especially to the tamarind tree.

"As it lives for a while contentedly in a cage, many are caught by the negro and colored boys, with bird lime, and by the use of the blowgun. Hence their scarcity; I have walked some days for several miles without seeing this or any other bird, along the shore of the west coast."

Fam. TANAGRIDÆ.

13. Euphonia flavifrons (Sparm.).

"'*Perrouche.*'

"Length, ♂, 5 in.; alar extent, 8; wing, 2½.

"Nowhere is this bird abundant. I have already chronicled its discovery in Dominica, St. Vincent, and Grenada, but in no island is it numerous. I might set it down as rare, did I not think it possible that it may occur in greater numbers than my researches have led me to suppose, from the fact that its secluded habits and its peculiar food cause it to betake itself to the tops of the highest trees, where it might be passed a hundred times without discovery. Though undoubtedly generally associating in small flocks, I have not as yet (with one exception), found it otherwise than alone. Its stomach always contains a peculiar viscid green flat seed, the name of which I cannot at this time recall."

14. Saltator guadeloupensis, Lafr.

"'*Gros-bec.*'

"Length, ♂, 8¼ in.; alar extent, 12; wing, 4.

"Length, ♀, 8 in.; alar extent, 12; wing, 3⅞.

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"Prefers the skirts of woods and open fields, utters a sharp whistle, not very loud, and flits from bush to tree in low flight. Rather abundant at Trois Islets on the hillsides. More numerous than I found it in Dominica; even plentiful in the low scrub, or second growth, that covered the hillsides upon old plantations."

Fam. FRINGILLIDÆ.

15. Loxigilla noctis (Linn.).

"'*Pere noir.*' '*Moisson.*'

"Length, ♂, 5½ in.; alar extent, 9; wing, 3.

"Length, ♀, 5 in.; alar extent, 8½; wing, 2¾.

"In the French islands and in those in which the patois is spoken, the names of this bird are the same; the male is called the '*Pere noir*', the female the '*moisson*'.

"They are as abundant here as any species and confined to the open fields and cultivated districts without regard to altitude."

16. Phonipara bicolor (Linn.).

"'Mangeur des herbes.' Seed-eater.

"Length, ♀, 4½ in.; alar extent, 6½; wing, 2.

"The most common species, I think, in the island. Feeds principally upon the seeds of grass and noxious weeds, and hence cannot be otherwise than of great benefit to the island."

Fam. ICTERIDÆ.

17. Icterus bonana (Linn.).

"'Carouge.'

"Length, ♂, 8 in.; alar extent, 10½; wing, 3½.

"Length, ♀, 7½ in.; alar extent, 10; wing, 3½.

"I saw my first specimen of this bird at Morne Ronge, another halfway up the volcano of Montagne Pelée; but did not obtain one until my visit to Trois Islets, south of Fort de France. It is not in abundance that one sees it; separately and in pairs. I found it chiefly in clearings on the hills and elevated plains. It prefers the vicinity of gardens and hedges, and shuns thick woods; though I have found it in dense scrub. Upon the hills near Trois Islets I secured it in such a situation. I was reclining beneath the shade of a low tree, one very hot day in August, looking out over the beautiful bay of Port Royal, when I was suddenly brought to my feet by the shock of an earthquake, which, repeated twice, startled the birds as well as myself. Then I noted for the first time this bird in the scrub beneath the trees."

18. Quiscalus inflexirostris, Sw.

"'Le Merle.' Iris, ♂, hazel; ♀, pale yellow.

"Length, ♂, 10¼ in.; alar extent, 15; wing, 5.

"Length, ♀, 9 in.; alar extent, 13¾; wing, 4½.

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"This is the first island in which I saw this bird, unless the blackbird of Grenada and the Grenadines be the same. It is abundant in the Jardin des Plantes and very numerous at Morne Ronge. Its notes are entirely different from the 'Bequia sweet' of the Grenadines; but that may be owing to the difference in season. The savannas of this high region contain many in parties of from 3 to 5.

"At Trois Islets they were in abundance and there I got many, showing the different changes in plumage from young to adult. There they built their nests in a tall silk-cotton tree. They love the fronds of the palm as a retreat, doubtless feeding upon the berries that hang beneath the overarching boat-shaped spathes in large bunches. Their cry is not like those of the Grenadines, nor like that of the north, the *Q. versicolor*—but has notes in it reminding me of both. Gregarious."

I have followed Mr. Sclater in referring this bird to Mr. Swainson's species; he says (P. Z. S. for 1874, p. 175): "In order to avoid giving it a fresh name I call it *Q. inflexirostris*, Sw., though the bill certainly does not quite agree with Swainson's figure (An. in Menag. p. 300)." The specimens before me differ from Swainson's figure of the bill spoken of above in being apparently shorter and stouter. Swainson says, l. c.: "Size and colour precisely like *Q. lugubris;* but the great difference in their bills induces me to consider them quite distinct. In this the bill is longer and much more slender," &c.

A comparison with *Q. lugubris* shows the present bird to closely resemble it in coloration: it is, however, somewhat larger, the bill longer and more curved, but proportionately not more slender.

Mr. Cassin in his Study of the *Icteridæ* (Proc. of Acad. Nat. Sci. of Phila. 1866, p. 407) refers a specimen in the Museum of the Academy to *Q. inflexirostris*, Sw.; he says: "One specimen only in the Acad. Mus. seems to be this species, but which is, unfortunately, without label stating locality. The bill is exactly the length and otherwise very nearly as given by Mr. Swainson as cited above, though somewhat thicker. It is the only specimen that I have ever seen in which the commissure is an uninterrupted curve or arc of a circle,—not straight nor sinuated as in all other species known to me (except *Q. niger* of St. Domingo) and described in this memoir."

The dimensions given by Mr. Cassin are about the same as those of specimens from Martinique, but the bills differ; he gives, "chord of upper mandible about one and four fifth inches." In the present bird it measures but one and a quarter inches.

A specimen of *Q. niger* from St. Domingo, presented by Prof. Gabb, is of about the same size, and differs in coloration only in having the breast and abdomen without lustre—the bills though are very different, that of *Q. niger* is wider at the base, longer, straighter, and narrower at the end; the commissure is nearly straight, and the ridge of the upper mandible is perceptibly flattened. The locality of Mr. Swainson's type is unknown, and possibly it may not be the Antillian species referred to

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it; but for the present, it is doubtless best to let it remain as Mr. Swainson's species.

On looking at my *Q. luminosus* from Grenada, I find it has a longer and more curved bill than the Martinique bird; the chord of the upper mandible measures one and a half inches. But with its highly lustrous and more violaceous plumage, together with the decided bright green color of the wings, it does not agree with the description given of *Q. inflexirostris*.

In the account of *Q. luminosus* I stated that it was the only West Indian species of *Quiscalus* I knew of in which both sexes were not black; but the female of the present bird is brown also. Of that sex, Mr. Ober sent but one adult example; the upper plumage is of a smoky-brown, the feathers of the crown edged with fulvous; the tail-feathers have their inner webs black, the outer webs are brown; sides of the head and the throat light ashy-gray; the breast and upper part of the abdomen are brownish-ash; lower part of abdomen, flanks, and under tail-coverts dark smoky-brown; thighs dull fulvous-brown; bill and feet black.

Fam. TYRANNIDÆ.

19. Elainea martinica (Linn.).

"Flycatcher. 'Gobe mouche.'

"Length, ♂, 7 in.; alar extent, 9½; wing, 3¼.

"Length, ♀, 6½ in.; alar extent, 10; wing, 3¼.

"Very few of this species to be seen; frequents the high hills, especially the wooded hollows and ravines."

20. Myiarchus sclateri, Lawr.

"Flycatcher."

The upper plumage is deep dark olive, the head above blackish-brown. Unfortunately, the only feathers left in the tail are the outer four on one side; the outermost two are dark brown and without rufous edgings on the inner webs; the other two feathers are brownish-black, with their inner webs edged with light rufous for about one-quarter their width; quills dark brown, their inner webs bordered with pale salmon-color; wing-coverts edged with dull white; under wing-coverts light ash, with just a tinge of yellow; throat and breast of a clear cinereous gray; abdomen and under tail-coverts dull pale yellow; sides cinereous; bill and feet black.

Length (fresh), 7½ in.; wing, 3¾; tail, 3½; tarsus, 1; middle toe and claw, 1⅛; hind toe to end of claw, ⅝.

The single specimen sent is of about the size of *M. erythrocercus*, Scl., but the plumage of the new species above is dark, with no approach to the earthy-brown color of the other; below they do not differ so much, but in *M. sclateri* the yellow is duller and more restricted; they differ materially in the rufous markings on the inner webs of the tail-feathers; in *M. erythrocercus* this color occupies about one-half the web on the

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outermost two feathers, and on the others two-thirds or more; the new species differs conspicuously in its much longer and stronger tarsi and toes.

Named in compliment to Mr. P. L. Sclater.

21. Tyrannus rostratus, Scl.

"'Piperee.' Resident.

"Length, ♂, 9½ in.; alar extent, 14¾; wing, 4¾.

"Length, ♀, 10 in.; alar extent, 15¼; wing, 4¾.

"These two specimens are the only ones I have seen. Though uncommon in Dominica, it may be considered rare here. Its local name, 'Piperee,' is in use throughout the islands, and is derived from its cry."

Fam. TROCHILIDÆ.

22. Eulampis jugularis (Linn.).

"'Colibri gorge rouge.'

"Length, ♂, 5⅛ in.; alar extent, 7½; wing, 3.

"Length, ♀, 5¼ in.; alar extent, 7; wing, 3.

"The most abundant of the humming-birds in the mountain districts, but of rare occurrence in the lower portions of the island. Not so abundant, however, as in Dominica."

23. Eulampis holosericeus (Linn.).

"Length, ♂, 4¾ in.; alar extent, 6; wing, 2¼.

"Length, ♀, 4¾ in.; alar extent, 6¼; wing, 2¼.

"This species is found in the mountains as well as in the valleys of the lowlands. It is found in the Jardin des Plantes, and on the elevated plateau of Morne Ronge and Champs Flores. In the elevated districts it is not in the numbers of *E. jugularis*."

24. Orthorhynchus exilis (Gm.).

"'Fou fou.'

"Length, ♂, 3½ in.; alar extent, 4¾; wing, 2.

"Length, ♀, 3½ in.; alar extent, 4¾; wing, 1⅞.

"This little gem is found all over the island, though not in such profusion as I found it in Dominica. In the Jardin des Plantes it is the most numerous species, perhaps. At Morne Ronge and at Trois Islets, I found it occasionally.

"As in the other islands where the French and French *patois* is spoken, this little bird is known to the common people as 'fou fou', or crazy crazy, from its eccentric motions while in flight.

"They have also a superstition that if you eat its body it will make you crazy, and in their ignorance they believe it is used by the physicians in some mysterious medicine—hence its vulgar name in the English 'slands of 'Doctor Bird'."

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Fam. CYPSELIDÆ.

25. "Chætura. Seen.

"Apparently the same as my Dominica specimens."

Fam. ALCEDINIDÆ.

26. Ceryle alcyon (Linn.).

"Seen; rare and shy."

Fam. CUCULIDÆ.

27. Coccyzus minor (Gm.).

"'Coucou manioc.'

"Length, ♂, 14 in.; alar extent, 17; wing, 6.

"Length, ♀, 13½ in.; alar extent, 16½; wing, 6.

"I found this species abundant, if one can say that any species is abundant in an island so barren of birds as this. At least I could find one almost any day, by beating the scraggy bushes upon the hillsides of Trois Islets. The same in habits and notes as the 'Coucou' of the other islands."

Fam. FALCONIDÆ.

28. Tinnunculus sparverius var. **antillarum** (Gm.).

"Seen; uncommon."

Fam. FREGATIDÆ.

29. Fregata aquila (Linn.).

"Seen."

Fam. PHÆTHONIDÆ.

30. Phæthon flavirostris Brandt.

"It undoubtedly has its haunt in the cliffs near St. Pierre, south, as I have seen it near there and the cliff wall is honeycombed with holes, just such as the Tropic bird chooses for itself."

Fam. PELECANIDÆ.

31. Pelecanus fuscus (Linn.).

"Seen."

Fam. ARDEIDÆ.

32. Ardea herodias (Linn.).

"Seen flying high above Champs Flores from the mountain forest to the ocean."

33. Florida cærulea (Linn.).

"Seen; in blue and white plumage."

34. Butorides virescens (Linn.).

"The most common, though not plentiful."

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Fam. COLUMBIDÆ.

35. Columba corensis (Gm.).

"'Ramier.' Iris yellow.

"Though persistently hunted, this bird still inhabits the mountains, making its home especially upon the volcano of Mountain Pelée. In all the highest hills and mountains it may be found in sparse numbers. Several attempts that I made to secure this species, on the sides of the volcano, were fruitless owing to its wildness."

36. Zenaida martinicana, Bp.

"'Tourterelle.'

"Rarely seen, but inhabits the dry slopes near the sea."

37. Chamæpelia passerina (Linn.).

"'Ortolan.' Resident.

"As the extent of cultivated and pasture land is greater than in Dominica, so is this bird found in greater numbers, though not abundant in either island."

38. Geotrygon montana (Linn.).

"'Perdix.' Iris gold; resident.

"Length, ♂, 11¼ in.; alar extent, 19; wing, 6½.

"Though this species is far from abundant, the natives occasionally bring the birds in for sale. The 'Ramier' is, perhaps, more plentiful, but from its more secluded habits and from its keeping itself in the air and on the tallest trees, never touching the ground, is less subject to persecution than the 'Perdix'. As in the United States, the snare and trap kill two to one killed by the gun; and the *springes* of the natives will soon exterminate this bird from the island and add it to the already growing list of animals that *were* and now are not."

Fam. SCOLOPACIDÆ.

39. Tringoides macularius (Linn.).

"'Becasse.'

"Length, ♂, 7½ in.; alar extent, 13½; wing, 4½.

"A resident, but merely a straggling one, left from the flocks that visit here in the winter months."

Fam. LARIDÆ.

40. Sterna dougalli, Mont.

"'Hirondelle de Mer.'

"The sea birds are mostly found on the Atlantic side of the island, which I did not visit. This species is common, now (August), about the shores of Port Royal Bay."

NEW YORK, *December* 31, 1878.

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NOTE ON PLATESSA FERRUGINEA, D. H. STORER, AND PLATESSA ROSTRATA, H. R. STORER.

By G. BROWN GOODE and TARLETON H. BEAN.

In a paper on the Fishes of Nova Scotia and Labrador, published in 1857,* Mr. H. R. Storer described a species of flounder under the name *Platessa rostrata*. This species has been a puzzle to ichthyologists. Dr. Günther, in 1862, ventured the remark, that it "appears to be allied to *Pleuronectes limanda*."† Professor Gill, in 1861, referred it to his nominal genus *Myzopsetta*, and in 1864 to *Limanda*.‡ While investigating the fauna of the Nova Scotia coast in 1877, the naturalists of the United States Fish Commission made especial efforts to find this species, but without success, which was a matter of some surprise, since nearly all the species recorded from the Gulf of St. Lawrence were observed in the course of the summer.§ In 1878, several specimens were trawled in Massachusetts Bay, which were strongly suggestive of Storer's *Platessa rostrata*, and which, upon comparison with his description, were found to agree with it in every particular except that in relation to the relative size of the scales on the superior portion of the operculum and the neighborhood of the lateral line, a matter apparently of individual variation. A more extended study of the subject has convinced us that the individuals at first studied, as well as the ones described by H. R. Storer, should be identified with *Platessa ferruginea*, D. H. Storer, a species which should undoubtedly be referred to the genus *Limanda* of Gottsche. *Limanda* was established by Gottsche in 1835 in Wiegmann's Archiv für Naturgeschichte (p. 160), and is synonymous with *Myzopsetta*, described by Professor Gill in 1864,‖ distinguished by him from *Limanda* by the following characters: "snout retuse" (instead of "conic"); "mouth very oblique" (instead of "moderately oblique").

* Observations on the Fishes of Nova Scotia and Labrador, with Descriptions of New Species. By Horatio R. Storer. p. 268, pl. viii, fig. 2. <*Boston Journ. of Nat. Hist.*, vi, 1857, pp. 247–270, pl. vii, viii.

† Catalogue of the Fishes in the British Museum, iv, 1862, p. 447.

‡ Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

§ Regarding the habitat of *Platessa rostrata*, Storer wrote as follows: "With the exception of one specimen at Red Bay, this species was met with only at Bras d'Or, where it is very abundant, inhabiting however a far different region from the (*Platessa*) *plana* just mentioned. Instead of sheltered bays and harbors, it delights in the surf of the ocean beaches exposed to the waves of the whole Gulf, and is here taken in great numbers at the drawing of the herring seines."—*Op. cit.* p. 269.

‖ Proc. Acad. Nat. Sci. Phila. 1864, p. 216 (in synopsis).

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The following enumeration of the radial formulæ of eleven specimens of *Limanda ferruginea* should be placed on record:

Cat. No.	Locality.	Dorsal rays.	Anal rays.	Pectoral rays.		Ventral rays.	Caudal rays.
				Right.	Left.		
21020	Halifax, N. S	85	65	12	.....	6	18
,,	.....do	81	59	11	10	6	18
,,	.....do	79	57	11	10	6	18
,,	.....do	85	63	11	10	6	18
21902	Gloucester, Mass	83	69	10	10	6	18
21903	.....do	87	66	12	11	6	.....
,,	.....do	80	60	13	12	6	.....
,,	.....do	82	61	11	11	6	.....
,,	.....do	83	61	11	11	6	.....
,,	.....do	73	58	11	10	6	.....
,,	.....do	76	59	11	10	6	.....

Certain individuals exhibit black spots instead of the ordinary markings of yellowish red; this may be sexual, but is more probably due to the color of the bottom on which they live. Adult individuals almost invariably exhibit markings of a lemon-yellow hue on the white under side of the body, contiguous to the tail.

The synonymy of the species stands as follows:

Limanda ferruginea, (Storer) Goode & Bean.

Platessa ferruginea, STORER, Report on the Ichthyology and Herpetology of Massachusetts, 1839, p. 41, pl. 2.—DEKAY, Zoology of New York, Fishes, 1842, p. 297, pl. xlviii, fig. 155.

Pleuronectes ferrugineus, GÜNTHER, Catalogue of the Fishes in the British Museum, iv, 1862, p. 447.

Myzopsetta ferruginea, GILL, Catalogue Fishes of Eastern Coast N. A. 1861, p. 51; Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

Platessa rostrata, H. R. STORER, Boston Journ. Nat. Hist. vi, 1850, p. 268, pl. viii, fig. 2.—GÜNTHER, op. cit. p. 447 (considers it to be allied to *Pleuronectes limanda*).

Myzopsetta rostrata, GILL, Catalogue Fishes of Eastern Coast N. A. 1861, p. 51.

Limanda rostrata, GILL, Proc. Acad. Nat. Sci. Phila. 1864, p. 217.

Limanda ferruginea is closely related to *Limanda vulgaris*, Gottsche, from which it is distinguished by its shorter pectorals, smaller scales, lower dorsal and anal fins, and the greater average number of rays in those fins. It is certainly a strongly marked geographical subspecies, and must for the present be regarded as a distinct species.

DECEMBER, 1878.

ON THE IDENTITY OF BROSMIUS AMERICANUS, GILL, WITH BROSMIUS BROSME, (MÜLLER) WHITE.

By G. BROWN GOODE and TARLETON H. BEAN.

Dr. D. H. Storer, in his Report on the Ichthyology and Herpetology of Massachusetts, published in 1839, catalogued the common cusk of the New England coast under the name *Brosmius vulgaris*, considering

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it to be identical with the European species of the same genus. In this he was followed by Dr. DeKay, in his Fishes of New York, published in 1842. In 1845, in his Synopsis of the Fishes of North America, Dr. Storer adopted for the American cusk the name *Brosmius flavescens*, which had been given in 1819 by Le Sueur to a supposed new species from Marblehead, Mass., characterized in his figures and descriptions by a prolonged lower jaw and a double barbel.*

We believe that the specimen described by Le Sueur was a deformed individual of the common species, but this is a mere matter of opinion, and in any event the name cannot be used. In 1863, Professor Gill substituted the specific name *americanus* for the name *flavescens* adopted by Storer.

After a careful examination and comparison of two specimens from Europe (No. 17,366, Norway, Bergen Museum) with specimens from Massachusetts Bay, we are compelled to believe that the common cusk of New England is identical with that of Europe. In the proportions of their bodies they agree exactly, and the Norwegian specimens agree in every respect with Storer's description of *Brosmius flavescens* in his History of the Fishes of Massachusetts. The radial formulæ of three specimens are given below:

No. 17366 A.	Bergen.	D. 91. A. 75.
No. 21813.	Gloucester.	D. 97. A. 75.
No. 17366 B.	Bergen.	D. 99. A. 73.

DECEMBER, 1878.

ON THE MORTALITY OF FISHES IN THE GULF OF MEXICO IN 1878.

By Lieut. J. P. JEFFERSON, U. S. A.

KEY WEST, FLORIDA.

Prof. SPENCER F. BAIRD,

Smithsonian Institution, Washington, D. C.:

PROFESSOR: I have the honor to acknowledge the receipt of your valued favor of October 30th, which reached me after a delay, I being absent from Fort Jefferson. This absence, coupled with my wish to get all possible facts in regard to the destruction of fish in these and neighboring waters, will account for my apparent tardiness.

Since my communication in October another large body of the dark-colored water described therein made its way down the coast, across Florida Bay, striking Tortugas about the 20th of November, and extending up the reef as far as Key West, probably further. At Key West its approach could be seen distinctly; at first, belts of it, some narrow, others broad, came into the harbor, following the various channels leading to the northward, and only in these belts were the fish affected; in the course of twenty-four hours, however, all the water in the harbor was similarly colored, and the surface was covered with dead and dying fish.

* Mémoires du Muséum, v, 1819, p. 158, pl. xvi.

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They seemed to be affected very much as I have seen them when "fish berries" were thrown into a pond—coming to the surface, swimming around in circles, sometimes on the side or back, the movements growing weaker rapidly and ceasing altogether in 20 or 30 minutes. I noticed one fact which may or may not be of importance: I took a small fish, known here as a cow-fish, from the water when just about dead, and, having examined it for a minute or two, cast it back, when, to my surprise, it swam off briskly, going down at once.

As in the previous instance, the shores at Fort Jefferson and neighboring keys were covered with fish, and here, at Key West, the north side of the island was in similar condition. From correspondence and conversation I have gathered, in addition to the above, the following facts, some, and possibly all, of which may be of interest.

A fishing-smack sailed some 70 or 80 miles to the westward from Fort Jefferson without getting clear of the water. Another smack found the surface of the water out some 15 miles in the Gulf Stream covered with dead fish—large sharks, turtles, king-fish, &c., but no porpoises, and, as far as I have heard, no dead porpoises have been seen. An officer coming over from New Orleans by steamer was more than 12 hours passing through a field of dead fish. Oysters in Tampa Bay were killed by the water. In October the Caloosahatchee River overflowed its banks along its entire length except at a bluff at Fort Meyers, and the whole country in that section was under water, reported to be the result of the overflow of Lake Okeechobee. A gentleman who knows that part of the State well tells me that the swampy land bordering on Okeechobee is grown up largely with dogwood; the water in the lake gradually rising and spreading over the surrounding marshes or swamps probably kept these dogwood trees wholly or partly submerged for weeks, until the divide between Okeechobee and the headwaters of Caloosahatchee River gave way. In the possible poisonous effect of water impregnated with dogwood, &c., a theory of the cause of the loss of fish-life may be found. I understand from Dr. Joseph Y. Porter, U. S. A., that he forwarded to your address a bottle of water. I am in hopes that an analysis of it will enable you to settle the question; if so, I would be indebted greatly to you if you would inform me.

In regard to my former letter, you can make any use of it you desire, as well also as this. I am happy to know that you consider the subject of some importance. I feared that I might be imposing upon your valuable time.

If there are any of the small fish of this vicinity which you desire I will be glad to do what I can towards obtaining them, either preserved in spirits or the skins. Please give me common names, if possible; for I have no books and no technical knowledge.

I am, sir, very respectfully, your obedient servant,

J. P. JEFFERSON,
Lieutenant Fifth Regiment Artillery.

DECEMBER, 1878.

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NOTES ON THE FISHES OF BEAUFORT HARBOR, NORTH CAROLINA.

By DAVID S. JORDAN and CHARLES H. GILBERT.

In the Proceedings of the Philadelphia Academy of Natural Sciences for 1877, pp. 203–218, is a paper entitled "Notes on the Natural History of Fort Macon, N. C., and Vicinity (No. 3)," by Dr. H. C. Yarrow, which treats of the species of fishes obtained by Drs. Coues and Yarrow in Beaufort Harbor and neighboring waters during the period of their residence at Fort Macon.

During the past summer (1878), the writers, accompanied by Prof. A. W. Brayton and a party of students from Butler University, spent three weeks in the month of August at Beaufort, the chief business of the party being the collection of fishes. We obtained, in all, about seventy-five species, many of which are not included in Dr. Yarrow's list.

For the purpose of making as complete a showing of the Ichthyology of the North Carolina coast as possible, we here include not only the species which we have ourselves observed, but also those taken by Drs. Coues and Yarrow. Brief notes on the local habits or distribution of each species are given, as well as occasional critical remarks on the nomenclature. The sequence and nomenclature are essentially as in Professor Gill's Catalogue of the Fishes of the East Coast of North America, 1873. The vernacular names here given are only those used by the Beaufort fishermen.

Family LOPHIIDÆ.

Genus LOPHIUS Linn.

1. Lophius piscatorius L.—*All-mouth.*

(*Lophius americanus* Gill, l. c.)

Not seen alive; two sets of jaw-bones picked up on the beach below Cape Lookout. Said to be occasionally taken by the fishermen. Until some evidence other than the difference of habitat is offered to show that the American "Angler," *Lophius americanus* DeKay, is distinct from the European *Lophius piscatorius* L., it seems to us that the burden of proof is on the side of the doubtful species. It seems better to consider the two forms on opposite sides of the Atlantic as identical until proved to be distinct, rather than distinct until proved to be identical. In the case of this and numerous other northern fishes of wide range, Dr. Gill (l. c.), on the contrary, has "preferred to retain the names given to the American forms as distinct species, although he is inclined to believe that they will eventually be found to be co-specific with other forms."

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DIODONTIDÆ.

Genus CHILOMYCTERUS Bibron.

2. Chilomycterus geometricus (L.) Kaup.—*Swell-toad.*

Very abundant; taken in every seine; sold by small boys as curiosities, at from one to five cents each.

TETRODONTIDÆ.

Genus LAGOCEPHALUS Swainson (Gill).

(*Tetrodon* Gill, l. c. The genus *Tetrodon*, as first restricted by Swainson, is essentially equivalent to *Arothron* Müller, which differs from *Lagocephalus* in its closed nasal tentacles. The name *Lagocephalus* is therefore accepted by Professor Gill for the present genus.)

3. Lagocephalus lævigatus (L.) Gill.

Found by Dr. Yarrow "in small streams running through salt marshes. But few seen."

Genus CIRRISOMUS Swainson.

(*Chilichthys* Müller, Gill, l. c. The genus *Cirrhisomus* of Swainson (1839) is based on *Chilichthys spengleri* (*Tetrodon spengleri* Bloch), and therefore antedates and must supersede *Chilichthys* Müller (1841).)

The name is given in allusion to the short, fleshy appendages or barbels along the sides in the typical species. These are not found in the other species of the genus, but the name cannot be set aside on that account. *Chilichthys* may perhaps be retained as a subgeneric name for those species without fleshy slips.

Cirrisomus differs from *Lagocephalus* chiefly in the form of the fins. In the latter genus, the dorsal and anal are falcate, of 11 to 14 rays each, and the caudal fin is forked. In *Cirrisomus*, these fins are all more or less rounded, and the dorsal and anal contain but 6 to 8 rays each. In *Lagocephalus*, the body is elongate, the caudal peduncle especially so, the skin comparatively smooth, except on the inflated part of the abdomen. There is a fold of skin along each side of the tail below (usually well marked, but nearly obsolete in *L. lævigatus*). The coloration is peculiar, the skin having a metallic lustre. In *Cirrisomus*, the body is comparatively short and broad, with short caudal peduncle. There is usually no fold along the lower side of the tail. The coloration is usually variegated, and without metallic lustre, and the prickles are variously arranged. Four species of *Cirrisomus* are found on our Atlantic coast: *C. turgidus* (L.), *C. testudineus* L., *C. trichocephalus* (Cope), and *C. spengleri* (Bloch). The first is common; the others are rare, or occasional visitants.

4. Cirrisomus turgidus (L.) Jor. & Gilb.—*Swell-toad; Puffer.*

Very common everywhere about Beaufort; taken in the nets with *Chilomycterus geometricus.*

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OSTRACIIDÆ.

Genus LACTOPHRYS Swainson.

5. Lactophrys trigonus (L.) Poey.

A specimen in the State Museum at Raleigh, from Beaufort. Two specimens were found on the beach at Fort Macon by Dr. Yarrow. Numerous specimens of another species (*Lactophrys quadricornis* (L.)), from the coast of South Carolina, are in the U. S. National Museum. This is a common West Indian species, not before recorded from our coast.

BALISTIDÆ.

Genus ALUTERA Cuvier.

6. Alutera cuspicauda DeKay.—*Fool-fish.*

Rather common in Beaufort Harbor. Numerous specimens obtained.

7. Alutera aurantiaca (Mitchill) Jor. & Gilb.—*Fool-fish.*

(*Ceratacanthus aurantiacus* Gill, l. c.)

Rather common; with the preceding. We find no warrant for the genus *Ceratacanthus* Gill, based on this species. It is certainly very closely related to the preceding.

Genus STEPHANOLEPIS Gill.

The genus *Stephanolepis* of Gill is essentially equivalent to *Monacanthus* as properly restricted by Bleeker and others. In this large genus there are two types, which may be called genera, each represented on our coast by one species. One of these, which contains the most of the species, and for which the name of *Stephanolepis* may be retained, has the abdominal flap small, and not exceeding the ventral spine. *Monacanthus* proper has the abdominal flap greatly developed, much exceeding the spine. *Monacanthus setifer* Bennett, of the former group, is very common on our coast. *Monacanthus occidentalis* Günther, of the latter group, is probably a straggler from the West Indies. *Canthorhinus* Swainson, occasionally used for this latter group, is apparently synonymous with *Liomonacanthus* Bleeker, over which name it has priority. *Canthorhinus*, thus defined, differs from *Monacanthus* in having the ventral spine immovable, and the dorsal spine without barbs.

8. Stephanolepis setifer (Bennett) Gill.—*Common Fool-fish.*

One of the commonest fishes in Beaufort Harbor, swarming everywhere about the wharves.

HIPPOCAMPIDÆ.

Genus HIPPOCAMPUS Cuvier.

9. Hippocampus antiquorum Leach.

Not common. Preserved by fishermen as a curiosity, and sold to visitors at about twenty-five cents each.

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SYNGNATHIDÆ.

Genus SIPHONOSTOMA Rafinesque (Gill).

10. Siphonostoma fuscum (Storer) Jor. & Gilb.

(*Syngnathus fuscus* et *peckianus* Storer.)

Very common among weeds along the Beaufort shore. The specimens taken were all small. Drs. Coues and Yarrow found this species and others of which we obtained many specimens, "rare," and *vice versa*. The chief reason of this discrepancy is found in the fact that our headquarters were in the village of Beaufort on the mainland, and our chief collections of small fishes were made among the wharves. Their headquarters were at Fort Macon, on one of the long sand islands or sand-spits which make such a characteristic feature of the North Carolina coast. On this outer island, "Fool-fish," "Pipe-fish," Blennies, and the like, are not found.

FISTULARIIDÆ.

Genus FISTULARIA Linn.

11. Fistularia tabaccaria L.

Two specimens observed by Dr. Yarrow.

SOLEIDÆ.

Genus APHORISTIA Kaup.

12. Aphoristia plagiusa (L.) Jor. & Gilb.

Abundant. Many young specimens taken on the sand-shoals. This species belongs to *Aphoristia*, and not to *Plagusia*, as the latter genus is restricted by Kaup and Günther. The proper orthography of the specific name is apparently *plagia*, not *plagiusa*, unless the latter was originally a misprint for *plagusia*.

Genus ACHIRUS Lacépède.

13. Achirus lineatus (L.) Cuv.

But one specimen seen by us at Beaufort. We obtained this Sole in the Neuse River, at Goldsboro', in completely fresh water, with *Belone longirostris*, *Ioa vitrea*, *Alvordius crassus*, *Noturus eleutherus*, *Boleosoma maculaticeps*, *Luxilus chlorocephalus*, *Zygonectes atrilatus*, *Hybognathus nuchalis*, *Micropterus pallidus*, etc.

PLEURONECTIDÆ.

Genus PSEUDOPLEURONECTES Bleeker.

14. Pseudopleuronectes americanus (Walb.) Gill.

Rare (Yarrow). Not seen by us.

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Genus PSEUDORHOMBUS Bleeker.

(*Chænopsetta* and *Ancylopsetta* Gill.)

In Professor Gill's Catalogue of the Fishes of the East Coast of North America, from Greenland to Georgia (Proc. Acad. Nat. Sci. Phila. 1861), many new genera are proposed without description or remark, most of them being defined at a later period. Two of the genera of Flounders there noted, *Chænopsetta* and *Reinhardtius* (proposed in 1861; defined in 1864), are apparently identical with *Pseudorhombus* and *Platysomatichthys* of Bleeker, proposed and defined in 1862. It is necessary, therefore, to substitute the latter ill-chosen names for the preferable names of Dr. Gill, if we hold with the present writers (and most others,—see Dall, Nomenclature of Zoölogy and Botany, 1877, pp. 17, 35) that a generic name *without a diagnosis*, placed before the names of one or more species, has no more claim on our recognition than an unpublished manuscript name. The adoption of either is a matter of courtesy or convenience, not of duty.

If the Pacific coast genus *Paralichthys* is truly sinistral, as supposed by Dr. Gill (Proc. Ac. Nat. Sci. Phila. 1864, 197), it is probably identical with *Pseudorhombus*, and as the prior name it should supersede the latter.

The genera of North American Flounders which seem to be worthy of retention may be thus compared:

* Pectoral fins well developed. (PLEURONECTIDÆ.)

† Mouth large, the broad, flat maxillary extending to below the eye; teeth nearly equal on the two sides of the jaws.

‡ Ventral fins both lateral, neither of them on the ridge of the abdomen. (*Hippoglossinæ*.)

a. Body dextral.

b. Caudal fin emarginate; teeth strong.

c. Lateral line arched in front ..... HIPPOGLOSSUS.

cc. Lateral line not arched ..... PLATYSOMATICHTHYS.

bb. Caudal fin entire, its middle rays produced; teeth moderate; lateral line not arched.

d. Dorsal beginning over eye; scales moderate, mostly ctenoid. HIPPOGLOSSOIDES.

dd. Dorsal beginning in front of eye; scales very small, cycloid. PSETTICHTHYS.

aa. Body sinistral; lateral line arched in front.

e. Caudal fin entire. (*Pseudorhombus* or) ..... PARALICHTHYS.

ee. Caudal fin emarginate ..... UROPSETTA.

‡‡ Ventral fin of the colored side on the ridge of the abdomen; body sinistral; teeth small. (*Rhombinæ*.)

f. Lateral line nearly straight; no vomerine teeth: dorsal rays all simple ..... CITHARICHTHYS.

ff. Lateral line arched in front; vomer with teeth; anterior rays of dorsal branched; scales cycloid .. LOPHOPSETTA.

†† Mouth small, the short, narrow maxillary scarcely reaching beyond the front of the eye: teeth mostly on the blind side. (*Pleuronectinæ*.)

g. Teeth slender, acute, in several series; body dextral; lateral line nearly straight, with a dorsal branch.

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h. Lips plicate; dorsal fin anteriorly twisted over to the blind side.....PLEURONICHTHYS.

hh. Lips simple; dorsal fin anteriorly on the dorsal ridge. HYPSOPSETTA.

gg. Teeth blunt, usually compressed, in one series, forming a cutting edge.

i. Body dextral.

j. Lateral line with a recurrent dorsal branch.

k. Lateral line nearly straight; scales cycloid, those on the cheeks similar.....PAROPHRYS.

kk. Lateral line arched in front; scales ctenoid; those on the cheeks stellate or tuberculate. LEPIDOPSETTA.

jj. Lateral line simple.

l. Lateral line arched in front; scales ctenoid..LIMANDA.

ll. Lateral line nearly straight.

m. Dorsal rays less than 80.

n. Scales ctenoid, closely imbricated. PSEUDOPLEURONECTES.

nn. Scales small, smooth or rough, scarcely imbricated.....PLEURONECTES.

mm. Dorsal rays more than 100; body elongate; scales smooth.....GLYPTOCEPHALUS.

ii. Body sinistral, covered with scattered stellated tubercles; lateral line nearly straight....PLATICHTHYS.

** Pectoral fins wanting (in our species); mouth twisted toward the colored side. (SOLEID.E.)

o. Vertical fins free from the rounded caudal; body dextral; ventral of the colored side continuous with the anal. (*Soleinæ.*)

p. Scales very rough; lateral line straight; teeth villiform, on blind side only.....ACHIRUS.

oo. Vertical fins confluent around the pointed tail; body sinistral; ventrals free from the anal. (*Plagusiinæ.*)

q. No lateral line; teeth minute, on blind side only; ventral fin of blind side only present; lips not fringed; snout not hooked; scales ctenoid.....APHORISTIA.

15. Pseudorhombus ocellaris (DeKay) Lyman.—*Flounder.*

(*Chænopsetta ocellaris* Gill, l. c.)

Very common.

16. Pseudorhombus dentatus (L.) Jor. & Gilb.

Tolerably abundant (Coues and Yarrow).

17. Pseudorhombus quadrocellatus (Gill) Jor. & Gilb.

Brownish olive, with four large ocellated spots, round or elliptical in shape; the first above the arch of the lateral line; the three posterior forming an isosceles triangle; the posterior one in the apex on the lateral line; body oval, compressed and much elevated, highest at middle of body; profile with an abrupt angle at anterior margin of orbit; lower

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eye beginning in front of the upper; mouth rather small, maxillary reaching to below middle of orbit; teeth comparatively small, about 14 on each side in the lower jaw, the canines of upper jaw little developed; dorsal fin beginning in front of pupil; its anterior rays long, filiform, and with free tips; anal fin beginning well forwards, but little behind the insertion of the ventrals; ventral fin of colored side much the longer; gill-openings comparatively narrow; branchiostegal membranes broadly connected at base; gill-rakers short and strong, few in number, less than 10 below the angle of the arch; head $3\frac{3}{4}$ in length to base of caudal; depth $1\frac{3}{4}$. D. 70. A. 55. Lat. l. about 90.

Two specimens were obtained in Beaufort Harbor, from one of which the above description was taken. This is probably the species noticed by Dr. Yarrow as *Chænopsetta oblonga*. It is a rare and little known species, noticed but once before on our Atlantic coast. Professor Gill's original type came from Pensacola, Fla.

Genus LOPHOPSETTA Gill.

18. Lophopsetta maculata (Mitch.) Gill.—*Plaice.*

Common on the sand bars.

GADIDÆ.

Genus PHYCIS Bloch & Schneider.

19. Phycis regius (Walb.) Jor. & Gilb.

(*Urophycis regius* Gill, l. c.)

One specimen taken by Dr. Coues. Another Gadoid was described to us as being sometimes taken.

OPHIDIIDÆ.

Genus OPHIDIUM Linn.

20. Ophidium marginatum DeK.

One specimen observed by Dr. Coues.

ZOARCIDÆ.

Genus ZOARCES Cuvier.

21. Zoarces anguillaris (Peck) Storer.

Two specimens taken by Dr. Yarrow from the wharf at Fort Macon.

BLENNIIDÆ.

Genus BLENNIUS Linnæus.

22. Blennius geminatus Wood.

Very abundant, especially about Duncan's wharf in Beaufort. Most of our specimens were taken from clusters of Ascidians. The specimen

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referred to by Dr. Yarrow as *Blennius fucorum* is probably of this species.

Genus HYPLEUROCHILUS Gill.

23. Hypleurochilus punctatus (Wood) Gill.

Abundant with the preceding and the next along the Beaufort shore.

Genus CHASMODES Valenciennes.

24. Chasmodes bosquianus (Lac.) C. & V.

Tolerably abundant along the Beaufort shore. Specimens of both the nominal species *C. bosquianus* and *C. novemlineatus* were taken. They differ only in coloration, and we have no doubt that the latter is the male and the former the female of the same species. We have received specimens of both forms, taken in Chesapeake Bay, from Prof. P. R. Uhler. This is the species called *Chasmodes quadrifasciatus* by Uhler and Lugger. The true *quadrifasciatus*, which may not be American, has never been recognized. The coloration in the male (?), or "*C. novemlineatus*," is in life as follows: Olive-green, with about nine horizontal narrow blue lines, these somewhat irregular and interrupted, and converging towards the lateral line; opercular membrane and a broad stripe through the middle of the spinous dorsal deep orange-yellow; anal fin dark, the fins with white membranaceous tips; head with fine black dots.

The female (?), or *C. bosquianus*, is dark olive-green, reticulated with narrow pale green lines and with several broad dark vertical bars, which are more distinct posteriorly; vertical fins similarly marked.

BATRACHIDÆ.

Genus BATRACHUS Linnæus.

25. Batrachus tau L.—*Toad-fish.*

Everywhere extremely abundant near the shore.

URANOSCOPIDÆ.

Genus ASTROSCOPUS Brevoort.

26. Astroscopus anoplus (C. & V.) Brev.

One specimen taken by Dr. Coues.

TRIGLIDÆ.

Genus DACTYLOPTERUS Lacépède.

27. Dactylopterus volitans (L.) Lac.—*Flying-fish*

Rather common. Some ten specimens obtained from fishermen seining in the harbor about Beaufort. The brilliant coloration in life is extremely variable.

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Genus PRIONOTUS Lacépède.

28. Prionotus punctatus (Bloch) Cuv.—*Slim Flying Toad.*

Two specimens taken.

29. Prionotus tribulus C. & V.—*Common Flying Toad.*

Very abundant in Beaufort Harbor. This is doubtless the species mentioned as *Prionotus carolinus* by Dr. Yarrow. Dr. Gill omits this strongly marked species from his Catalogue, apparently confounding it with *P. carolinus* (*palmipes* Storer), which it resembles in color, although its real relations are entirely with *P. evolans*. We have seen no specimens of "*P. carolinus*" from the coast of Carolina, and we do not see how, from the Linnæan description, *P. carolinus* could be distinguished from *P. tribulus*. It becomes, therefore, perhaps an open question whether Linnæus's *Trigla carolina* was *P. tribulus*, or "*P. carolinus*," or both. Linnæus's *Trigla evolans* is apparently equally uncertain, so that the present nomenclature of the species must be accepted as provisional only.

30. Prionotus evolans (L.) Gill.—*Striped Flying Toad.*

Abundant in the harbor with the preceding species.

The following is an analysis of the characters of the species of *Prionotus* found in the United States. *P. pilatus* Storer is not included, it being probably identical with *P. carolinus*.

* Mouth small: the mandible not reaching the vertical from the front of the orbit: a distinct transverse groove connecting the upper posterior angles of the orbit: preopercular spine simple, without basal cusp: head short, the spines on its upper part comparatively weak: blotches on spinous dorsal well defined, ocellated. (Subgenus *Prionotus*.)

† Body very slender: sides with numerous roundish brown or bronze spots.

P. punctatus (Bloch) C. & V.

Coloration dark olive above: back and sides covered with numerous round spots of different sizes, and not arranged in series: these spots bronze color in life, becoming brownish after death: spinous dorsal dusky, with lighter streaks: a distinct black spot on upper half of spinous dorsal, between the fourth and fifth spine, this spot being ocellated below and behind: a second black blotch on upper half of first spine and membrane, also ocellated behind: second dorsal and caudal spotted and finely blotched with black: anal largely black, with a pinkish border: pectorals blackish: ventrals pale: branchiostegals pinkish: first dorsal rather high: head 3¼ times in length to base of caudal: maxillary one-third length of head. D. X—13, A. 11., lat. l. about 75.

†† Body rather robust: sides with conspicuous round spots.

P. carolinus (L.) C. & V.

Coloration brownish above, clouded with darker: throat and branchiostegal membrane dark: a distinct black blotch on upper half of spinous dorsal, this ocellated below: second dorsal with oblique whitish streaks: preopercular spine strong: pectoral appendages strong, always (?) dilated at their tips: maxillary bone one-third the length of head: head 3 in body. D. X—13, A. 12, lat. l. ca. 55.

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Mouth large, the mandible reaching beyond the vertical from the front of the orbit: no distinct transverse groove between and behind orbits: preopercular spine with a smaller one at base: dark blotches on spinous dorsal diffuse, not ocellated. (Subgenus *Chriolax nobis.)

‡ Sides of body with one or more distinct dark longitudinal bands: spines on head moderate, compressed.

P. evolans (L.) Gill.

Coloration olive-brown above, mottled and spotted with darker and lighter, whitish below: a narrow dark streak along the lateral line, with a broader one below it, which terminates behind in a series of spots and blotches: lower parts of head sometimes bright orange-yellow: pectorals blackish, surrounded by olivaceous and edged with orange, sometimes with numerous transverse dark lines: a black blotch on membrane of dorsal fin between the third and sixth spines: soft dorsal plain or with two black blotches at base: ventrals and anal deep orange: pectoral appendages slender, dark-colored: spine at upper posterior angle of orbit but little developed: body robust: head 2¼ in length. D. X—12, A. 11, lat. l. about 55.

‡‡ Sides without longitudinal bands: spines on head all well developed, those above closely compressed.

P. tribulus C. & V.

Dark brown on sides and above, blotched with darker: a black blotch on membrane of dorsal between the third and sixth spines: second dorsal with several series of brownish spots, these forming oblique bars: soft dorsal with two dark blotches at base, the posterior of which is continued obliquely downwards and forwards to below the lateral line: pectorals olive-brown, with dark bands, which are more distinct towards the tip of the fin: pectoral appendages strong, tapering, marked with series of dark spots: body heavy forwards, short and thick: occipital and supraorbital spines strong and "flattened like sword-blades": head 2½ in length to base of caudal. D. X—12, A. 11, lat. l. about 50.

LABRIDÆ.

Genus TAUTOGA Mitchill.

31. Tautoga onitis (L.) Gthr.—*Oyster-fish.*

Rather common. The young abundant about the wharves at Beaufort.

Genus PUSA Scopoli (fide Gill).

(*Chœrojulis* Gill; *Halichœres* Rupp.)

32. Pusa grandisquamis Gill.

The original type of this species came from Beaufort. Another was secured by Dr. Yarrow.

33. Pusa sp. (**? radiata** L.).

A young specimen which we supposed to belong to this species, but which was mislaid or lost before we had a full opportunity for comparison, was taken near Captain Duncan's wharf at Beaufort. Its life-coloration was as follows:

Bright green: a dark brown lateral band covering two rows of scales:

*χρεία, want: ὦλαξ, furrow.

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above this, three bronze bands with green interspaces; below it, a band of crimson; these bands running forwards, and meeting on the snout: dorsal fin bright vermillion, with a large blue spot ocellated with yellow near its middle, a smaller dark-blue spot at base of last dorsal ray, and another at base of caudal: anal red, with a yellowish streak: caudal nearly plain: iris red. Length 1½ inches.

Professor Gill informs me that the name *Pusa* Scopoli was first applied to a species of this most beautiful genus. If this be true, it has many years' priority over *Chœrojulis*, *Halichœres*, etc.

XIPHIIDÆ.

Genus XIPHIAS Linn.

34. Xiphias gladius L.—*Sword-fish.*

'Heard from' off Cape Lookout by Dr. Yarrow.

TRICHIURIDÆ.

Genus TRICHIURUS Linn.

35. Trichiurus lepturus L.

Several seen by Cope and Yarrow; none by us.

SCOMBRIDÆ.

Genus SARDA Cuvier.

36. Sarda pelamys (L.) Cuv.

Taken off Shackleford Banks (Yarrow). Not seen by us.

Genus ORCYNUS Cuvier.

37. Orcynus thynnus (L.) Goode.—*Bonito.*

(*Orcynus secundodorsalis* Gill, l. c.)

Frequently heard of, but not seen by us.

Genus CYBIUM Cuvier.

38. Cybium maculatum (Mitch.) Cuv.—*Spanish Mackerel.*

A highly valued food-fish, taken in great numbers in the fall, on the banks. No extensive fishing is done in August, and we did not see this species at Beaufort. A large one leaped on board our steamer in Albemarle Sound on our return northward.

39. Cybium regale (Bloch) Cuv.

One specimen seen by Dr. Yarrow.

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CARANGIDÆ.

Genus VOMER Cuvier.

40. Vomer setipinnis (Mitch.) Ayres.—*Moon-fish; Sunfish.*

Taken on the outer beach in the fall; not seen by us.

Genus SELENE Lacépède.

41. Selene argentea Lac.—*Moon-fish.*

Taken on the outer beach in the fall; not common; one specimen obtained by us.

Genus ARGYRIOSUS.

42. Argyriosus vomer Lac.—*Moon-fish.*

Less common (Yarrow). Not seen by us. There seems to be no good evidence that *Argyriosus capillaris* is a species distinct from this.

Genus ALECTRIS Rafinesque.

(*Blepharis*, etc., Cuvier; *Blepharichthys*, etc., Gill.)

43. Alectris crinitus (Akerly) Jor.

A few individuals taken by Dr. Yarrow; none seen by us at Beaufort. Most of the Scombroid fishes about Beaufort are taken by the fishermen on the outer banks in the fall, and hence escaped our notice.

The genus *Blepharichthys* Gill seems unnecessary, as the prior use of *Blepharis* in Botany does not, in accordance with the general custom of naturalists, prevent its use in Zoölogy. The distinctions between *Blepharis* and *Alectris*, being merely in the degree of obsolescence of the spinous dorsal, do not seem to us important.

Genus CARANGUS Girard.

44. Carangus chrysus (Mitch.) Gill.—*Sunfish.*

Rather common in Beaufort Harbor. Several young specimens taken among the wharves.

45. Carangus hippus (L.) Gill.

In Dr. Yarrow's list; not seen by us.

46. Carangus pisquetos (C. & V.) Gill.

(*Paratractus pisquetos* Gill, l. c.)

One specimen seen by Coues and Yarrow.

Genus TRACHYNOTUS Lacépède.

47. Trachynotus ovatus (L.) Gthr.—*Allorericore* (*Albicore?*).

One young specimen taken at Beaufort.

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48. Trachynotus carolinus (L.) Gill.—*Pampano; Sunfish.*

Very abundant on the outer banks. The young go in great schools in the surf, and may be readily taken in a net, and sometimes by hand when thrown on shore by the waves.

Genus SERIOLA Cuvier.

(*Halatractus* and *Zonichthys* Gill.)

49. Seriola zonata (Mitch.) Cuv.

One specimen observed by Dr. Yarrow; not seen by us. *Naucrates ductor*, included in Dr. Yarrow's list on the strength of information derived from fishermen, we here omit: the species is too easily confounded with the present.

STROMATEIDÆ.

Genus PORONOTUS Gill.

50. Poronotus triacanthus (Peck) Gill.

Rare; seen by Coues and Yarrow—not by us.

SCIÆNIDÆ.

Genus CYNOSCION Gill.

51. Cynoscion carolinensis (C. & V.) Gill.—*Speckled Trout.*

An abundant food-fish.

52. Cynoscion regalis (Bloch) Gill.—*Sea Trout.*

A common food-fish, although less abundant than the preceding.

Genus POGONIAS Lacépède.

53. Pogonias chromis Lacép.—*Sea Drum.*

Very common.

Genus LIOSTOMUS.

54. Liostomus xanthurus Lacép.

Abundant in the fall (Yarrow); not seen by us.

55. Liostomus obliquus (Mitch.) DeKay.—*Spot.*

Next to the Mullet, this is the most abundant food-fish about Beaufort, the young swarming everywhere in the harbor. It is universally known as *Spot*, the Robin or Pin-fish being *Lagodon*, and the Hog-fish *Orthopristis*. These vernacular names have been transposed by Dr. Yarrow.

Genus BAIRDIELLA Gill.

56. Bairdiella punctata (L.) Gill.—*Perch.*

Rather common among the wharves.

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Genus SCIÆNOPS Gill.

57. Sciænops ocellatus (L.) Gill.—*Drum.*

A rather common food-fish; numerous specimens obtained from the fishermen. One specimen obtained had *two* ocellated spots on the caudal peduncle.

Genus MENTICIRRUS Gill.

58. Menticirrus littoralis (Holbr.) Gill.—*Sea Mullet.*

Rather common. The young abundant in the surf on the outer beach, with *Trachynotus carolinus.*

59. Menticirrus alburnus (L.) Gill.

Not seen by us.

60. Menticirrus nebulosus (Mitch.) Gill.

Not seen. Dr. Yarrow says that this species and the two preceding are "all more or less abundant in the fall, when they are found in company with the Mullet on the sea-beach."

Genus MICROPOGON Cuvier.

61. Micropogon undulatus (L.) C. & V.—*Croaker.*

Very abundant; next to Mullet, Spot, and Hog-fish, the commonest food-fish in Beaufort Harbor.

GERRIDÆ.

Genus EUCINOSTOMUS Baird & Girard.

62. Eucinostomus argenteus B. & G.

Common in the harbor, along the Beaufort shore. Only very young specimens seen.

PIMELEPTERIDÆ.

Genus PIMELEPTERUS Lacépède.

63. Pimelepterus bosci Lac.

A single specimen taken near Duncan's wharf in Beaufort.

SPARIDÆ.

Genus LAGODON Holbrook.

64. Lagodon rhomboides (L.) Holbr.—*Robin; Pin-fish.*

Excessively abundant everywhere in the harbor. Taken by the thousand by boys with hook and line, from the wharves. This species does not attain a large size, and is seldom used as food in Beaufort, where larger fishes are so plenty. Its value there is about one-tenth of a cent, and it is thrown away by the fishermen. As elsewhere noticed, the "Spot," "Robin," and "Hog-fish" of the fishermen have been in some way misunderstood or confused by Dr. Yarrow.

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Genus ARCHOSARGUS Gill.

65. Archosargus probatocephalus (Walb.) Gill.—*Sheepshead.*

Abundant; we saw but few specimens, however, the proper Sheepshead season being passed.

Genus SARGUS Cuvier.

66. Sargus holbrooki Bean.—*Spot-tailed Pin-fish.*

Extremely abundant everywhere along the Beaufort shore. This species was first described by Dr. Bean during the past year. That so strongly marked and so abundant a species should have so long escaped notice is very remarkable. Dr. Yarrow does not seem to have noticed it and Dr. Coues obtained but one specimen, the generic characters of which seem to have escaped Professor Putnam's notice, as he speaks of it as "an individual resembling *S. argyrops*," but differing in color. This species has broad incisors and wants the recumbent dorsal spine. Its color is bright silvery, with a large black blotch on the upper part of the caudal peduncle, which is very conspicuous while the fish is in the water. It reaches but a small size, and is not at Beaufort used as food. The fishermen call it Pin-fish, and as such it is beneath their notice. Most of the fishermen, indeed, did not distinguish it from *Lagodon rhomboides.*

Genus STENOTOMUS Gill.

67. Stenotomus argyrops (L.) Gill.

Not very common; hardly noticed by the fishermen.

PRISTIPOMATIDÆ.

Genus HÆMULUM Cuvier.

68. ? Hæmulum arcuatum C. & V.

Not seen by us; given in Dr. Yarrow's list, but evidently confused with the next species, so that its occurrence at Beaufort is questionable. The proper orthography of the generic name (αἷμα, blood; οὖλον, gums) is *Hæmulum*, not *Hæmylum*, nor *Hæmulon.*

Genus ORTHOPRISTIS Girard.

69. Orthopristis fulvomaculatus (Mitch.) Gill.—*Hog-fish.*

Extremely common everywhere in the harbor.

SERRANIDÆ.

Genus EPINEPHELUS Bloch.

70. Epinephelus morio (Cuv.) Gill.

One specimen noted by Dr. Yarrow.

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Genus CENTROPRISTIS Cuvier.

71. Centropristis atrarius (L.) Bum.—*Black-fish.*

Common, the young abounding about the wharves.

PERCIDÆ.

Genus ROCCUS Mitchill.

72. Roccus lineatus (Mitch.) Gill.—*Rock.*

Not seen in Beaufort Harbor, but abundant in all river-mouths, as in New and Neuse Rivers. Dr. Yarrow states that the "young are abundant" in the harbor. As the striped female of *Hydrargyra majalis* is called by all Beaufort fishermen "Rock," and as it is there usually supposed to be the young of the Striped Bass, Dr. Yarrow's statement may perhaps be an error.

Genus MORONE Mitchill.

73. Morone americana (Gmel.) Gill.—*White Perch.*

Not found about Beaufort, but said by Dr. Yarrow to abound in the New and Neuse Rivers.

EPHIPPIDÆ.

Genus PAREPHIPPUS Gill.

74. Parephippus faber (Cuv.) Gill.—*Porgee; Pogy.*

Common; used as a food-fish.

POMATOMIDÆ.

Genus POMATOMUS Lac.

75. Pomatomus saltatrix (L.) Gill.—*Blue-fish.*

Extremely common. The taking of this fish is the favorite amusement of the higher grades of summer boarders in this delightful port.

ECHENEIDIDÆ.

Genus ECHENEIS Linnæus.

(*Leptecheneis* Gill.)

In 1862 (Proc. Acad. Nat. Sci. Phila. 239), Prof. Gill divided the Linnæan genus *Echeneis* into two genera, *Echeneis* (the slender species: type *E. naucrates* L.) and *Remora* (the stout-bodied species: type *E. remora*). Subsequently (op. cit. 1863, 88), *Remoropsis* (which has not been sufficiently distinguished from *Remora*) and *Rhombochirus* were added. Still later (op. cit. 1864, 60), Prof. Gill found, "on examining the works of Linnæus and Artedi, that *E. remora* was the only species referred to that genus by Linnæus in the early editions of the Systema

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Naturæ, and by Artedi, and that in the later editions, Linnæus placed that species at the head of the genus." For that reason, the name *Echeneis* was retained for *E. remora*, and a new name, *Leptecheneis*, conferred on *E. naucrates* and its allies.

As, however, according to the custom now prevalent in Ichthyology, we are not to go behind the tenth edition of the Systema Naturæ, and as the placing of a species "at the head of the genus" had no significance with Linnæus, we think that Dr. Gill's first restriction of *Echeneis* should have precedence over the second.

The genera of *Echeneididæ* thus far known are, then, the following:

1. REMORA Gill: type *Echeneis remora* L.; *Echeneis jacobæa* Lowe.
2. REMILEGIA Gill: type *Echeneis australis* Bennett.
3. RHOMBOCHIRUS Gill: type *Echeneis osteochir* Cuvier.
4. ECHENEIS Linn.: type *Echeneis naucrates* L.
5. PHTHEIRICHTHYS Gill: type *Echeneis lineatus* Menzies.

76. Echeneis naucrates L.

Two specimens seen by Coues and Yarrow.

Genus REMORA Gill.

77. Remora jacobœa (Lowe) Gill.

(*Echeneis remora* L.)

Specimens seen by Dr. Yarrow, taken off Shackleford Banks.

SPHYRÆNIDÆ.

Genus SPHYRÆNA Bloch.

78. Sphyræna spet (Hally) Goode.

Young specimens common in Beaufort Harbor. Our species is usually called *Sphyræna borealis* DeKay, without comparison with allied forms. What fish DeKay had in mind is not clearly known. We identify our Beaufort specimens with *Sphyræna spet* (*Esox sphyræna* L., *Sphyræna vulgaris* Auct.), the common species of Europe and the Middle Atlantic. Whether the West Indian *S. picuda* also occurs northward, to help form the dubious *Sphyræna borealis*, is still uncertain.

MUGILIDÆ.

Genus MUGIL Linnæus.

79. Mugil brasiliensis Agassiz.—*White Mullet.*

Very common in the harbor.

80. Mugil plumieri Bloch.—*Striped Mullet.*

The commonest food-fish of the North Carolina coast; everywhere very abundant on the shoals in the harbor.

Two species of *Mugil* certainly occur on our Atlantic coast, but they have been confounded or misunderstood by nearly all writers exc

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Dr. Günther, who correctly describes them under the names *Mugil lineatus* and *Mugil brasiliensis*. The nomenclature of both is uncertain. The oldest specific name, *Mugil albula* L., is apparently not available, as its description applies equally to either, and is in some respects incorrect. It is, however, perhaps as applicable to *M. brasiliensis* as that of *Trigla evolans* is to our striped *Prionotus*. The following is Linnæus's description:

"Mugil Albula. M. pinna dorsali anteriore quadriradiata. D. 4, 9. P. 17. V. $\frac{1}{5}$. A. $\frac{3}{17}$. C. 20, xxx. Habitat in America. D. Garden. Simillimus *M. cephalo.*"—(Syst. Nat. xii, i, 520, 1766).

The diagnostic characters and the apparent synonymy of the two species are the following:

Mugil brasiliensis Agassiz.

White Mullet.

? Catesby, ii, pl. 5.
? *Curema* Macgr. 181, Pison 70.
? *Mugil albula* Linn. Syst. Nat. ed. xii, i, 520, 1766.
Mugil brasiliensis Agassiz, Spix, Pisc. Bras. 234, tab. 72 (*fide* Günther).—Günther, Cat. Fishes Brit. Mus. iii, 431.
? *Mugil incilis*, Hancock, Lond. Quart. Journ. Sc. 1830, 127 (*fide* Günther).
Mugil curema Cuv. et Val. xi, 87, and of authors.
Mugil petrosus Cuv. et Val. xi, 89, and of authors.
Mugil lineatus Storer, Hist. Fishes Mass. 89, pl. 16, f. 4 (good).

Body somewhat compressed: angle made by the dentary bones about a right angle: space at the chin between the dentary bones somewhat club-shaped: scales larger, running up on the soft dorsal and anal fins: coloration bluish above, the sides silvery without conspicuous dark stripes, but with shining streaks, produced by the striation of the scales: a dusky blotch at base of pectorals: tips of caudal and soft dorsal blackish. Anal rays III, 9. Scales 38—12. Size less than the next.

Mugil plumieri Bloch.

Striped Mullet.

Mugil plumieri Bloch, t. 296, and of authors.
Mugil lineatus Mitchill, Cuv. et Val. xi, 96, and of nearly all authors.
Mugil albula DeKay, New York Fauna, Fishes, 146.
Mugil berlandieri Girard, U. S. Mex. Bound. Ichth. p. 20, pl. x, fig. 1 (not fig. 4, which represents the young of *M. brasiliensis*).

Body little compressed: angle of mandible obtuse: space between dentary bones broad and short, rounded anteriorly: scales smaller, not running up on the dorsal and anal fins. Coloration dark bluish above; sides silvery, with series of darker spots, one on each scale, forming conspicuous lateral stripes: a dusky spot at base of pectorals. Anal rays III, 8. Scales 42—13. The common "Mullet," so extensively split and salted as a food-fish.

The two species seem to occur on the same shores, and both range from Massachusetts to South Carolina at least.

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ATHERINIDÆ.

Genus CHIROSTOMA Swainson.

81. Chirostoma menidium (Linn.) Gill.—*Sardines.*

We fail to find any evidence that *Chirostoma notatum* (Mitch.) Gill and *C. menidium* are distinct species. Very abundant in the harbor, where it is found generally in company with *Engraulis vittata*, both being known by the fishermen indiscriminately as Sardines.

Genus ATHERINA Linnæus.

82. Atherina carolina Val.

A few specimens noted by Drs. Coues and Yarrow.

BELONIDÆ.

Genus BELONE Cuvier.

83. Belone longirostris (Mitch.) Gill.

Very abundant in Beaufort Harbor.

84. Belone hians C. & V.

One specimen obtained. This is a West Indian species, not recorded from our coast until this summer, when Prof. Goode received a number of specimens from the coast of North Carolina. It is probably a resident on our coast, as the specimen taken was quite young.

SCOMBERESOCIDÆ.

Genus EXOCŒTUS Linnæus.

85. Exocœtus melanurus Val.—*Flying-fish.*

"Occasionally seen" (Dr. Yarrow).

Genus HALOCYPSELUS Weinland.

86. Halocypselus evolans (Linn.) Gill.

One young specimen taken in Beaufort Harbor.

Genus HEMIRHAMPHUS Cuvier.

87. Hemirhamphus unifasciatus Ranzani.

Very abundant in the harbor, along the edges of shoals.

Genus SCOMBERESOX Lacépède.

88. Scomberesox scutellatus Le Sueur.

Recorded by Dr. Yarrow.

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CYPRINODONTIDÆ.

Genus CYPRINODON Lacépède.

89. Cyprinodon variegatus Lac.—*"Sheep's Head."*

One specimen seen by us.

Genus FUNDULUS Lacépède.

90. Fundulus heteroclitus (Linn.) Gill.

Very common. The species called *F. pisculentus* (Mitch.) Val. and *F. heteroclitus* are unquestionably identical.

Genus HYDRARGYRA Lacépède.

91. Hydrargyra majalis (Walb.) Val.—*Rock Fish* (♀).

Very abundant.

92. Hydrargyra swampina Lac.

Reported as exceedingly abundant by Drs. Coues and Yarrow.

SYNODONTIDÆ.

Genus SYNODUS Bloch.

93. Synodus fœtens (Linn.) Gill.—*Pike.*

Abundant in the harbor.

ALBULIDÆ.

Genus ALBULA Gronovius.

94. Albula vulpes (Linn.) Goode.—*Lady Fish.*
(*Albula conorhynchus* Gill, op. cit.)

Reported by Dr. Yarrow on the authority of a fisherman.

ELOPIDÆ.

Genus ELOPS Linnæus.

95. Elops saurus Linn.—*"Horse Mackerel."*

One very large specimen seen.

Genus MEGALOPS Lacépède.

96. Megalops thrissoides (Bl. & Schn.) Günther.

Reported by Dr. Yarrow as very rare, on the authority of fishermen.

CLUPEIDÆ.

Genus BREVOORTIA Gill.

97. Brevoortia tyrannus (Latrobe) Goode.—*Fat Back; Yellow Tail; Bug Fish.*

Very abundant.

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Genus ALOSA Cuvier.

98. Alosa sapidissima (Wilson) Storer.

Probably not found in Beaufort Harbor. Reported by Drs. Coues and Yarrow as excessively abundant in the Neuse River.

Genus OPISTHONEMA Gill.

99. Opisthonema thrissa Gill.

Several specimens obtained.

Genus POMOLOBUS Rafinesque.

100. Pomolobus pseudoharengus (Wilson) Gill.

Recorded by Dr. Yarrow as not abundant.

101. Pomolobus mediocris (Mitch.) Gill.

Recorded by Dr. Yarrow as abundant.

ENGRAULIDIDÆ.

Genus ENGRAULIS Cuvier.

102. Engraulis vittatus (Mitch.) Bd. & Girard.—*Sardine.*

Extremely common, occurring in large schools. There is no good evidence that the West Indian *E. browni* (Gmel.) Val. occurs on our coast, or that we have more than one Atlantic species.

SILURIDÆ.

Genus ÆLURICHTHYS Baird & Girard.

103. Ælurichthys marinus (Mitch.) Bd. & Grd.

Several specimens obtained.

Genus ARIOPSIS Gill.

104. Ariopsis felis (Linn.) Gill & Jordan.

(*Ariopsis milberti* Gill, op. cit.)

Several specimens seen.

ANGUILLIDÆ.

Genus ANGUILLA Thunberg.

105. Anguilla vulgaris Turton.—*Eel.*

(*Anguilla bostoniensis* Gill, op. cit.)

Common.

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ACIPENSERIDÆ.

Genus ACIPENSER Linnæus.

106. Acipenser sturio Linn.—*Sturgeon.*

A large skin found in the harbor near Cape Lookout.

CEPHALOPTERIDÆ.

Genus CERATOPTERA Müller & Henle.

107. Ceratoptera vampirus (Mitch.) Gill.—*Devil-fish.*

Fishermen state that they are occasionally found in the harbor.

MYLIOBATIDÆ.

Genus AËTOBATIS Müller & Henle.

108. Aëtobatis narinari Müll. & Henle.

One large specimen seen.

Genus MYLIOBATIS Duméril.

109. Myliobatis fremenvillei (Les.) Storer.

Tail of one specimen observed.

DASYBATIDÆ.

(*Trygonidæ* Gill, op. cit.)

Genus DASYBATIS Rafinesque (fide Gill).

(*Trygon* Gill, op. cit.)

110. Dasybatis centrurus (Mitch.) Gill, MSS.—*Sting Ray; Stingaree.*

Very common.

Genus PTEROPLATEA Müller & Henle.

111. ? Pteroplatea maclura (Le Sueur) M. & H.—*Skate.*

Several specimens about one foot long, the young of some broad species. They do not answer Le Sueur's account of the present species, and there is no trace of a caudal spine, which on a Sting Ray of the same size is fully developed. If not the young of *Pteroplatea*, they will constitute a new genus.

The following are the characters shown by our specimens:

Disk very broad and short, its width nearly twice its length without the tail; tail short, slender and small, its length about one-third that of the disk; a dermal fold above and below; whole disk and tail covered with smooth skin, without spine or roughness of any kind; snout pro-

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jecting and pointed; the pectorals broadly expanded on each side, leaving a marked concavity in the outline of the body along their anterior margins on each side, in front of which is a convexity which terminates in the mucronate snout.

Mouth small; teeth triangular, rather pointed; nostrils well apart, confluent with the mouth; a broad flap behind and between them, which seems to form an upper lip.

Color brownish olive, beautifully marbled with grayish, and marked with roundish stellate spots and finer markings of dark brown; edge of disk with rounded pale spots, forming semicircles on the border; tail with four dark blotches above, forming half-rings.

TORPEDINIDÆ.

Genus TORPEDO Duméril.

112. Torpedo occidentalis Storer.

Recorded as rare, by Dr. Yarrow, on the authority of fishermen.

RAIIDÆ.

Genus RAIA Linnæus.

113. Raia lævis Mitch.

Recorded by Dr. Yarrow as common.

CARCHARIIDÆ.

Genus CARCHARIAS Rafinesque.

(*Odontaspis* Agassiz; *Eugomphodus* Gill.)

114. Carcharias americanus (Mitch.) Jor. & Gilb.

(*Eugomphodus littoralis* Gill, op. cit.)

One pair of jaws seen. The name *Carcharias* has priority over *Odontaspis*, as Dr. Gill has shown, and our species seems hardly generically distinct from the European.

SPHYRNIDÆ.

Genus SPHYRNA Rafinesque.

115. Sphyrna zygæna (Linn.) Müll. & Henle.

A single specimen recorded by Dr. Yarrow.

Genus RENICEPS Gill.

116. Reniceps tiburo (Linn.) Gill.—*Shovel-headed Shark; Bonnet-head.*

Abundant.

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GALEORHINIDÆ.

Genus SCOLIODON Müller & Henle.

117. Scoliodon terræ-novæ (Rich.) Gill.—*Sharp-nosed Shark.*

Very abundant in the harbor.

AMPHIOXIDÆ.

Genus AMPHIOXUS Yarrell.

118. Amphioxus caribæus (Sundevall) Jor. & Gilb.

Abundant in the harbor, on Bird Shoal; not, however, obtained by us.

DECEMBER, 1878.

A PARTIAL LIST OF THE BIRDS OF CENTRAL CALIFORNIA.

By L. BELDING, of Stockton.

Edited by R. RIDGWAY.

The present paper is based upon observations extending through about twenty years' residence in California, and collections made chiefly during the last two years, which have, from time to time, been forwarded by Mr. Belding to the National Museum.* The list is believed to be a tolerably complete one, Mr. Belding's long residence in the State and his active interest in ornithology having enabled him to become quite familiar with the bird-fauna of most parts of the interior of California. Still, observations made at a few outlying points, or extended for a longer period at localities already investigated, would, no doubt, add considerably to the number of the species. The editor's remarks are either enclosed in brackets or followed by his initials ("R. R."). He is responsible for the nomenclature adopted, and the determination of the species—although, as to the latter, Mr. Belding had correctly identified them all, with a very few exceptions among the difficult forms, whose correct determination is hardly possible in the field.

The asterisk before the number indicates that the species has been found breeding in Central California; and only those actually ascertained to do so are thus marked. In the list of specimens, the asterisk before the locality shows that the species breeds at that particular place. The number in these lists is that of the National Museum Register, in which the specimens sent by Mr. Belding are entered. Notes upon a few of the species collected by Mr. Belding have been published by the writer in the Bulletin of the Nuttall Ornithological Club for April, 1878, pp. 64–68, to which those interested are referred.—R. R.

* The collections thus far received from Mr. Belding amount to about 180 species (not including races) and 600 specimens. Notes were sent on 38 additional species, making a total of 217 treated in this paper.—R. R.

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CENTRAL CALIFORNIA, where the collections and observations upon which this paper is based were made, is divided naturally into three quite distinct parts: (1) the valleys near sea-level; (2) the chaparral belt, familiarly known to Californians as the "foot-hills"; and (3) the evergreen coniferous forests above the chaparral belt. The periods during which the collections were made are as follows:—*At Stockton* (valley region), March 6 to June 9, 1878, and during the succeeding autumn. *At Marysville* (valley region), from December 24, 1877, to March 5, 1878, and, incidentally, in June, 1878. *At Murphy's* (lower edge of pine region), from November 20, 1876, to May 3, 1877, November 22 to December 22, 1877, and August 27 to September 6, 1878. At the *Calaveras Big Trees* (pine region), from May 3 to June 8, and from July 4 to August 27, 1878. *At Soda Springs* (upper part of pine region), from August 25 to October 6, 1877, about a week of this time being spent at the *Summit Meadows*, near the summit of the Donner Lake Pass of the Sierra Nevada.

STOCKTON, SAN JOAQUIN CO. (lat. about 38°, alt. 30 ft.), is on the eastern margin of the extensive tule swamp through which the San Joaquin River flows. Many of the birds peculiar to the inland waters of the Pacific coast frequent this swamp in summer or winter, while others, among which are some of the water birds of the neighboring tule marshes, breed in the willows on the banks or natural levees of the river. During the spring migration, birds are truly abundant in the thickets by the river, and any one who has heard their songs at this time would not accuse California birds of being deficient in melody.

The valley east of Stockton is very level, and sparsely timbered, though the principal water-courses are marked by a narrow strip of oaks and willows. In ordinary winters, water is plentiful, but in summer only the waters of the principal rivers reach the ocean. Owing to this scarcity of water in the breeding season, birds are not numerous in this portion of the valley, while for this and other reasons few species are abundant in Central California.

The climate is genial and quite uniform, the heat of summer being usually agreeably tempered by the sea breeze. The winters are mild and the fields are green with short grass.

MARYSVILLE, YUBA CO., is in latitude 39° 8′, the altitude being about 150 feet above tide-level. It is situated at the junction of the Yuba and Feather Rivers, surrounded by an extensive tract of level plains, most of which are under cultivation. Over the uplands are scattered a few oaks, both evergreen and deciduous, while in the river-bottoms are dense thickets of poplars and willows, with an undergrowth of grape-vines, briers, weeds, and grass. These thickets afford shelter for the birds of the district, and in the breeding season nearly all the species are congregated in or near them.

The summers are warm and dry, and, as elsewhere in the interior of California, the annual plants are either ripe or blighted by the first of

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June. The winters are mild; snow rarely falls, the plains after the first rains being covered with grass, which, however, does not grow much until March. Some of the species found at Marysville in winter are the following:—*Turdus nævius*, *T. migratorius* (var. *propinquus*), *T. guttatus*, *Harporhynchus redivivus*, *Mimus polyglottus*, *Dendrœca coronata*, *D. auduboni*, *Helminthophaga celata* (var. *lutescens*), *Geothlypis trichas*, *Vireo huttoni*, *Chrysomitris pinus*, *C. lawrencii*, *Eremophila alpestris* (both the typical form and var. *chrysolæma*), *Sayornis nigricans*, *S. sayus*, *Picus pubescens*,* *P. nuttalli*, *Sphyropicus ruber*, *Melanerpes formicivorus*, *Asio accipitrinus*, *Spcotyto "hypogœa,"* *Lanius borealis*, *L. ludovicianus*, *Melospiza "fallax,"* and *Pipilo chlorurus*. In June, the following, among others, were noticed:—*Turdus ustulatus*, *Thryomanes bewicki* (var. *spilurus*), *Lanivireo "cassini,"* *Vireo pusillus*, *Coccyzus americanus*, *Polioptila cœrulea*, *Picus "gairdneri,"* *P. nuttalli*, *Trochilus alexandri*, and *Chamœa fasciata*.

MURPHY'S, CALAVERAS CO. (lat. 38° 7′, alt. about 2,400 ft.), is situated at the line of junction of the chaparral belt and the pine region; that is, between the upper edge of the former and the lower limit of the latter, the line between these two districts being sharply drawn by the abrupt rise of the mountains on the east.

The climate of Murphy's is nearly the same as that of Stockton, notwithstanding the great difference of altitude (over 2,300 feet). The days are rather warmer, even in winter, if the sky is unclouded: it is more subject to cold storms, however; but if snow falls, it soon melts, and the hills are invariably covered with green grass after the fall rains. It is above the winter fogs of the valley. The average rainfall at Murphy's averages nearly twice as much as that at Stockton, the rainy season being longer, while the precipitation is more copious.

The following species may be said to find the upper limit to their breeding range in the vicinity of Murphy's:—*Harporhynchus redivivus*, *Chamœa fasciata*, *Polioptila cœrulea*, *Lophophanes inornatus*, *Salpinctes obsoletus*, *Icteria longicauda*, *Phainopepla nitens*, *Carpodacus frontalis* (var. *rhodocolpus*), *Chrysomitris lawrencii*, *Cyanospiza amœna*, *Pipilo "crissalis,"* *Icterus bullocki*, *Tyrannus verticalis*, *Myiarchus cinerascens*, *Picus nuttalli*, *Melanerpes formicivorus*, *Lanius ludovicianus* (var. *excubitoroides*), *Geococcyx californianus*, and some others. This restriction, though not absolute, is nearly so, and is due mainly to the abrupt change in the character of the forest.

About a mile east of Murphy's, the road makes an unbroken ascent of ten or twelve hundred feet in two miles. For the next thirteen miles there is no material change in the altitude; but at this point there is another rise of about eight hundred feet. At the top of this rise is the "Big Tree" Grove.

* Typical specimen sent from this locality!—R. R.

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The following is a list of the birds observed at various times in the immediate vicinity of Murphy's:—

1. *Turdus guttatus.*
2. *Turdus nævius.*
*3. *Harporhynchus redivivus.*
*4. *Sialia mexicana.*
5. *Sialia arctica.*
6. *Cinclus mexicanus.*
7. *Regulus satrapa.*
8. *Regulus calendula.*
*9. *Polioptila cærulea.*
*10. *Lophophanes inornatus.*
*11. *Psaltriparus minimus.*
*12. *Sitta "aculeata."*
13. *Sitta canadensis.*
14. *Certhia "americana."*
15. *Salpinctes obsoletus.*
16. *Catherpes "conspersus."*
17. *Thryomanes "spilurus."*
18. *Anthus ludovicianus.*
19. *Helminthophaga ruficapilla.*
20. *Helminthophaga "lutescens."*
*21. *Dendrœca æstiva.*
22. *Dendrœca auduboni.*
23. *Dendrœca coronata.*
24. *Dendrœca nigrescens.*
25. *Myiodioctes "pileolatus."*
*26. *Icteria "longicauda."*
*27. *Progne subis.*
*28. *Petrochelidon lunifrons.*
*29. *Hirundo "horreorum."*
30. *Stelgidopteryx serripennis.*
*31. *Vireosylvia "swainsoni."*
*32. *Phainopepla nitens.*
*33. *Lanius "excubitoroides."*
34. *Pyranga ludoviciana.*
35. *Carpodacus "californicus."*
*36. *Carpodacus "rhodocolpus."*
*37. *Chrysomitris psaltria.*
*38. *Chrysomitris lawrencii.*
39. *Chrysomitris pinus.*
40. *Passerculus "alaudinus."*
*41. *Chondestes grammica.*
42. *Zonotrichia intermedia.*
43. *Zonotrichia coronata.*
44. *Junco oregonus.*
45. *Amphispiza belli.*
*46. *Spizella "arizonæ."*
47. *Melospiza "guttata."*
48. *Melospiza lincolni.*
49. *Peucæa ruficeps.*
50. *Passerella "megarhyncha."*
51. *Passerella "townsendi."**
*52. *Hedymeles melanocephalus.*
*53. *Cyanospiza amœna.*
*54. *Pipilo "megalonyx."*
55. *Pipilo chlorurus.*
*56. *Pipilo "crissalis."*
*57. *Sturnella "neglecta."*
*58. *Icterus bullocki.*
*59. *Scolecophagus cyanocephalus.*
60. *Corvus americanus.*
61. *Cyanocitta "frontalis."*
*62. *Aphelocoma californica.*
*63. *Tyrannus verticalis.*
*64. *Myiarchus cinerascens.*
*65. *Sayornis nigricans.*
66. *Sayornis sayus.*
67. *Contopus borealis.*
*68. *Contopus richardsoni.*
*69. *Empidonax pusillus.*
70. *Empidonax obscurus.*
71. *Empidonax hammondi.*
72. *Ceryle alcyon.*
*73. *Trochilus alexandri.*
*74. *Calypte annæ.*
75. *Selasphorus rufus.*†
76. *Stellula calliope.*
77. *Picus "harrisi."*
78. *Picus "gairdneri."*
*79. *Picus nuttalli.*
80. *Sphyropicus "ruber."*
81. *Sphyropicus thyroideus.*
*82. *Melanerpes formicivorus.*
83. *Melanerpes torquatus.*
*84. *Colaptes "mexicanus."*
*85. *Scops asio.*
86. *Glaucidium gnoma.*
87. *Æsalon columbarius.*
*88. *Tinnunculus sparverius.*
89. *Accipiter fuscus.*
*90. *Buteo "calurus."*
91. *Rhinogryphus aura.*
92. *Columba fasciata.*
*93. *Zenædura carolinensis.*
94. *Oreortyx picta.*
*95. *Lophortyx californica.*
*96. *Ægialitis vocifera.*
97. *Ardea herodias.*‡
98. *Herodias "egretta."*

* In winter only. † In spring only.

‡ This and the succeeding water birds visit us only in winter and spring. Probably none breed here.

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99. *Butorides virescens.*
100. *Nyctiardea "nævia."*
101. *Botaurus lentiginosus.*
102. *Ardetta exilis.*
103. *Gallinago wilsoni.*
104. *Tringoides macularius.*
105. *Anas boschas.*
106. *Mareca americana.*
107. *Dytes "californicus."*
108. *Podilymbus podiceps.*

From August 27 to September 5, 1878, forty-two species were observed. Many of the summer residents had gone. Those remaining were—

1. *Turdus migratorius* (var. *propinquus*).
2. *Harporhynchus redivivus*, few.
3. *Sialia mexicana*, common.
4. *Polioptila cærulea* (only one).
5. *Chamæa fasciata*, common.
6. *Lophophanes inornatus*, common.
7. *Psaltriparus minimus*, common.
8. *Salpinctes obsoletus*, common.
9. *Sitta "aculeata,"* rare.
10. *Troglodytes "parkmanni,"* rare.
11. *Dendræca æstiva*, rare.
12. *Hirundo "horreorum,"* common.
13. *Petrochelidon lunifrons*, very rare.
14. *Vireosylvia "swainsoni,"* rare.
15. *Phainopepla nitens*, rather rare.
16. *Lanius "excubitorides."*
17. *Pyranga ludoviciana.*
18. *Carpodacus "rhodocolpus,"* very common.
19. *Chrysomitris psaltria*, very common.
20. *Chondestes grammica*, very common.
21. *Spizella "arizonæ,"* common.
22. *Pipilo "megalonyx,"* common.
23. *Pipilo "crissalis,"* very common.
24. *Sturnella neglecta*, common.
25. *Scolecophagus cyanocephalus*, rare.
26. *Aphelocoma californica*, common.
27. *Cyanocitta "frontalis"* (one).
28. *Tyrannus verticalis* (four).
29. *Myiarchus cinerascens* (one).
30. *Sayornis nigricans*, common.
31. *Contopus borealis* (two).
32. *Contopus richardsoni*, rare.
33. *Empidonax pusillus*, rare.
34. *Calypte annæ*, common.
35. *Coccyzus americanus* (heard one).
36. *Picus nuttalli*, common.
37. *Melanerpes formicivorus*, common.
38. *Colaptes "mexicanus,"* common.
39. *Rhinogryphus aura*, few.
40. *Zenædura carolinensis*, common.
41. *Oreortyx picta* (one seen).*
42. *Lophortyx californica*, abundant.

BIG TREES, CALAVERAS CO. (lat. 38° 15′, alt. 4,500 ft.), is in the heart of the coniferous forest of the Sierra Nevada. In this locality the pines, firs, cedars, and other conifers attain their largest size and most perfect growth. Deciduous oaks constitute a very small part of the forest, but they are mostly confined to the more barren spots. The climate at Big Trees is agreeably temperate during a portion of May, and throughout June, July, August, and September. The winters are mild, considering the altitude; but snow, to a depth of one to four or five feet, usually covers the ground, although some seasons the surface is bare for the greater portion of the time.

The summer avifauna of this locality resembles, to a considerable extent, that of Soda Springs and Summit Meadows, the more notable absentees being *Pinicola "canadensis,"* *Hesperiphona vespertina*, *Zonotrichia intermedia*, *Picicorvus columbianus*, and *Picoides arcticus*, all of which, however, probably visit Big Trees at some time of the year.

*More were probably present, as a gentleman told me a flock had *bred* there the past season, on a level with Murphy's.

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Birds seen at Big Tree Grove, Calaveras County, from July 4 to August 27, 1878.

*1. *Turdus migratorius* (var. *propinquus*), abundant.
2. *Mimus polyglottus*, very rare.
*3. *Cinclus mexicanus*, common.
*4. *Sialia mexicana*, common.
5. *Sialia arctica*, rare.
*6. *Regulus satrapa*, rare.
*7. *Parus montanus*, common.
8. *Psaltriparus minimus*, rather rare.
*9. *Sitta "aculeata,"* common.
*10. *S. canadensis*, decidedly abundant.
11. *S. pygmæa*, rare.
*12. *Certhia "americana,"* abundant.
*13. *Troglodytes "parkmanni,"* rather rare.
*14. *Helminthophaga ruficapilla*, common.
*15. *Helminthophaga "lutescens,"* common.
*16. *Dendræca æstiva*, common.
*17. *Dendræca occidentalis*, very common.
*18. *Dendræca nigrescens*, in July, rare.
19. *Dendræca auduboni*, rare.
*20. *Geothlypis macgillivrayi*, common.
21. *Myiodioctes "pileolatus,"* common in August.
*22. *Hirundo "horreorum,"* common.
23. *Petrochelidon lunifrons*, rare.
24. *Tachycineta thalassina*, abundant.
*25. *Vireosylvia "swainsoni,"* common.
*26. *Lanivireo "cassini,"* common.
*27. *Pyranga ludoviciana*, common.
*28. *Carpodacus "californicus,"* very common.
29. *Chrysomitris psaltria*, rare.
30. *Chrysomitris pinus*, rare.
*31. *Spizella "arizonæ,"* abundant.
*32. *Passerella "megarhyncha,"* common.
*33. *Hedymeles melanocephalus*, common.
*34. *Pipilo "megalonyx,"* common.
*35. *Pipilo chlorurus*, common.
36. *Icterus bullocki*, very rare.
37. *Scolecophagus cyanocephalus*, rare.
*38. *Cyanocitta "frontalis,"* abundant.
39. *Aphelocoma californica*, common.
40. *Tyrannus verticalis*, very rare.
41. *Myiarchus cinerascens*, very rare.
42. *Sayornis nigricans*, rather common.
*43. *Contopus borealis*, common.
*44. *Contopus richardsoni*, common.
45. *Empidonax pusillus*, rare.
46. *Empidonax obscurus*, probably not rare.
*47. *Empidonax hammondi*, common.
48. *Empidonax "difficilis,"* very rare.
49. *Calypte annæ*, rare.
50. *Trochilus alexandri*, rare.
51. *Stellula calliope*, rare.
52. *Selasphorus rufus*, common.
*53. *Picus "harrisi,"* common.
*54. *Picus "gairdneri,"* rather rare.
*55. *Picus albolarvatus*, abundant.
*56. *Sphyropicus "ruber,"* quite abundant.
*57. *Hylotomus pileatus*, not rare.
58. *Melanerpes formicivorus*, very rare.
*59. *Colaptes "mexicanus,"* common.
*60. *Bubo "subarcticus,"* common.
61. *Glaucidium gnoma*, rare.
62. *Tinnunculus sparverius*, rather rare.
*63. *Zenædura carolinensis*, common.
*64. *Canace obscura*, rather rare.
*65. *Oreortyx picta*, common.
*66. *Lophortyx californica*, common.

From May 3 to June 8, 1877, I found, in addition to most of those found in July and August, the following species:—

1. *Lanius "excubitorides,"* rare.
2. *Carpodacus cassini*, common.
3. *Melospiza lincolni*, rare.
4. *Sturnella neglecta*, rare.
5. *Corvus americanus*, irregular visitants.
6. *Thryomanes "spilurus,"* rare.

The Hawks and Owls peculiar to the mountains of California are probably as numerous here as in other parts of the Sierras, but the density and height of the forest make their capture difficult.

At Moran's and Dunbar's Meadows, two or three miles west, and about 800 feet lower, I found the following in July and August, 1878:—

1. *Chondestes grammica*, common.
2. *Xanthocephalus icterocephalus* (one juv. August 27).
3. *Sturnella neglecta*, common.
4. *Ceryle alcyon*, rare.
5. *Tringoides macularius* (one), very rare.

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I arrived at Big Trees May 3, 1877, and by May 10 nearly all the summer residents had arrived. Some of them had preceded me. Many of them, especially the Warblers, were seen on the route from Murphy's to this place.

The spring of 1877 was earlier than that of 1878, the winter of the former year having been very dry and mild. This probably accounts for the difference in the arrivals of some of the birds, as shown by the following figures. Probably I did not see some of them until some time after their arrival, especially if rare.

Number.	Name of species.	Arrival of birds at—	
		Murphy's, 1877.	Stockton, 1878.
1	*Helminthophaga ruficapilla*	April 11	.....
2	*Helminthophaga "lutescens"*	20	April 22
3	*Dendræca nigrescens*	15	17
4	*Dendræca æstiva*	26	15
5	*Myiodioctes "pileolata"*	18	May 6
6	*Vireosylvia "swainsoni"*	26	1
7	*Hirundo "horreorum"*	March 15	March 20
8	*Petrochelidon lunifrons*	15	17
9	*Stelgidopteryx serripennis*	15	.....
10	*Progne subis*	13	March 16
11	*Icterus bullocki*	24	April 1
12	*Hedymeles melanocephalus*	May 1	May 6
13	*Pyranga ludoviciana*	April 30	.....
14	*Phainopepla nitens* (arrived at Jenny Lind, March 12, 1874)	March 13	.....
15	*Spizella "arizonæ"*	April 17	May 1
16	*Tyrannus verticalis*	12	March 20
17	*Myiarchus cinerascens*	17	April 27
18	*Empidonax obscurus*	28	.....
19	*Empidonax "hammondi"*	25	May 9
20	*Pipilo chlorurus*	17	.....
21	*Polioptila cærulea*	5	March 23

SODA SPRINGS, PLACER CO.—This place is on the North Fork of the American River, ten miles south of the Central Pacific Railroad, on the west side of the "divide," or crest-line, of the Sierra Nevada; Lake Tahoe being on the east side, ten or fifteen miles distant. Altitude of the springs, 6,009 feet; the latitude, 39° 11′. The mountains between this place and Lake Tahoe rise 2,500 or 3,000 feet higher. This is above the region of deciduous oaks, the trees being all evergreens, except a species of dwarf maple and a few alders, willows, and aspens, which grow along the river. It is a rugged, almost desolate, region, though an interesting one. Grouse and Mountain Quails are comparatively plentiful, and trout-fishing is quite good. The Warblers are well represented here: I have found here the young of *Dendræca auduboni*, *D. occidentalis*, *D. nigrescens*, *Helminthophaga ruficapilla*, *H. celata*, and other species.

On frosty mornings in September, birds were exceptionally numerous in a few of the more sunny glades along the river, consisting chiefly of *Junco oregonus*, *Spizella breweri*, *S. socialis*,* *Zonotrichia intermedia*, *Passerella megarhyncha*, *Pipilo chlorurus*, *Parus montanus*, *Dendræca auduboni*, etc., etc. The Humming-birds fled when the first frost killed the flowers.

* Certainly both species.—L. B.

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[The following species, all of which are known to occur in some part of California, have not been met with by Mr. Belding in the central portion of the State. Many of them are very local, while others occur only in certain districts, at particular seasons.—R. R.]

*Polioptila melanura,** Lawr.
*Polioptila plumbea,** Baird.
Parus occidentalis,† Baird.
Parus rufescens,‡ Towns.
Cotyle riparia, (Linn.).
*Vireo vicinior,** Coues.
?Loxia leucoptera,§ Gmel.
Ægiothus linaria,§ (Linn.).
Leucosticte littoralis,§ Baird.
?Centrophanes lapponicus,§ (Linn.).
Passerculus anthinus,‡ Bonap.
Passerculus rostratus,‖ (Cass.).
Coturniculus perpallidus,¶ Ridgw.
Molothrus ater, (Bodd.).
Corvus carnivorus, Bartr.
Corvus caurinus,‡ Baird.
Chætura vauxi, (Towns.).
Nephœcetes borealis, Kennerly.
*Calypte costæ,** (Boarc.).
Selasphorus alleni,‡ Henshaw.
Pandion carolinensis, Gmel.
Astur atricapillus,§ (Wils.).
Squatarola helvetica, (Linn.).
Charadrius virginicus, Börck.
Ægialitis semipalmata, Bonap.
Ægialitis nivosa, Cass.
Phalaropus fulicarius, (Linn.).
Ereunetes pusillus.
Tringa bairdi, Coues.
Tringa maculata, Vieill.
Colymbus torquatus, Brünn.
Colymbus pacificus, Lawr.
Colymbus septentrionalis, Linn.
Podiceps hölbolli, Reinh.

Family TURDIDÆ: The THRUSHES.

***1. Turdus migratorius, β. propinquus,** Ridgw.—*Western Robin.*

This bird visits the valleys only in winter, when it is sometimes abundant, especially during the coldest weather. In summer it is rarely seen out of the pine forests, though about the first of September, 1878, twenty-five or thirty were observed in an orchard at Murphy's.

It was first seen** at Stockton, October 21, 1878.

73866	♂ ad.	*Murphy's.....	Apr. —, 1877

2. Turdus nævius, Gm.—*Varied Thrush.*

This bird arrives at Stockton about the middle of November and leaves in March or April, according to the season. It arrived at Soda Springs, October 1, 1877.

It is usually a common winter sojourner of the foot-hills, and also of

* Probably confined to the southern portion of the State.

† Found among the oaks of the plains east of Sacramento, in June, 1867, by the writer; common.

‡ Probably confined to the coast district.

§ Undoubtedly occur on the high Sierras in winter.

‖ Found by Mr. Belding at Santa Cruz, September, 1870.

¶ Common at Sacramento, in June, 1867.

** Sometimes, for the sake of variety, the word "arrived" is used. This, in all cases, must necessarily be but a substitute for the word "seen," or "first seen." Though, when constantly in the field, as was the case at Murphy's in the spring of 1877, and at Stockton in the spring of 1878, if *common*, a species was probably seen soon after its arrival. "Was seen," means by myself. The birds were all shot by me, unless credited to others.

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the valley, in suitable localities, but I did not find it at Murphy's from the middle of November, 1876, to May, 1877, though the following November and December it was abundant there.

Its alarm-note is a short "chook," its call a prolonged, nearly monotonous "chee," or "yee," and I have heard it sing sweetly about March 1. I once mistook its call for the bleating of a distant lamb, although the bird was not far from me.

73867	♂	ad.	Soda Springs	Oct. 1, 1877
73868	♂	ad.	do	Oct. 1, 1877
73869	♂	ad.	Murphy's	Oct. 1, 1877
76533	♀	ad.	Stockton	Nov. 8, 1878
76534	♂	ad.	do	Nov. 8, 1878

***3. Turdus ustulatus,** Nutt.—*Russet-backed Thrush.*

About a dozen of this species were seen in the willows at Marysville in June, 1878, and there were probably many more, as their songs were heard on several occasions in different parts of a thicket of willows, briers, etc. I am not aware of meeting it elsewhere. Its delicious song is not likely to be forgotten by one who has heard it.

74431	.....	*Marysville	June 22, 1878
76537	.....	do	June 14, 1878

4. Turdus guttatus, (Pall.).—*Dwarf Thrush.*

The Dwarf Thrush is probably a constant resident at Stockton, as it is common in winter and as late as June 8, 1878, at this time being confined to thickets near water. In winter it is more generally distributed, being often seen in gardens. It, or a near relative, is abundant at Murphy's in winter, and leaves that place in April.*

It seems to be very rare in the Sierras in summer, during which I have not been able to find it at Big Trees. Two or three were noticed at Soda Springs, all of them on and after September 22, 1877.

73870	—	ad.	Marysville?	Winter, 1877
76535	—	ad.	Murphy's	Winter, 1877
76536	♀	ad.	Stockton	May 30, 1878

***5. Mimus polyglottus,** (Linn.).—*Mocking-bird.*

A single bird of this species, in first plumage, was shot July 22, at "Big Tree Grove." It appears to be a constant resident of Marysville, where it has long been known to breed. A pair were often seen by a friend in Stockton during the past winter, and there are several young birds here that were taken from their nests at Hornitos, Mariposa Co. Still, it is by no means a common bird in this region.

A specimen was seen in a garden at Stockton on the 24th of December, 1878.

Nearly any citizen of the valley will, on being asked, say he knows the

* Quite certainly the present species.—R. R.

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Mocking-bird, but when asked to describe it, gives the description of the Sickle-bill Thrush or the Black-headed Grosbeak, or, occasionally, the Long-tailed Chat.*

73609	— ad.	*Marysville	Dec. 26, 1877
76361	— juv.	*Big Trees	July 22, 1878

6. Oreoscoptes montanus, (Towns.).—*Sage Thrasher.*

About October 1, 1877, at Soda Springs, I saw a strange Thrush, which may have belonged to this species, as I do not know what else it could have been. I had a good view of it, but did not shoot, because too near. I began to walk away from it, when it went into the bushes by the river. It had been sitting six or eight feet from the ground on a dead limb of a tree. When it flew, its course was downward, toward the thicket, a few feet distant.

***7. Harporhynchus redivivus**, (Gamb.).—*Sickle-bill Thrasher.*

The Sickle-bill Thrasher is a constant resident at Stockton, Murphy's, and Marysville, and is very common in the chaparral belt. It is rare at Stockton, for want of suitable ground.

73786	♂ ad.	*Marysville	Jan. —, 1878
74268	♂ ad.	*North American	Mar. 15, 1878
73871	— ad.	*Murphy's	Mar. 15, 1878

Family CINCLIDÆ: The WATER OUZELS.

***8. Cinclus mexicanus**, Swains.—*American Water Ouzel; Dipper.*

This bird is in summer abundant in the clear streams of Calaveras Co., shunning those which have been muddied by mining operations.

I have several times seen it swim across the surface of one of the abandoned mining claims at Murphy's, and, while fishing for trout in the streams of the Upper Sierras, have often seen it swim on the surface—at times floating with the rapid current; but it is proper to mention that this is not its usual habit. It sometimes swims a distance of twenty or thirty yards in still water. It is an occasional winter visitant to Murphy's, below which I have never seen it.

73531	— ad.	*Soda Springs	Sept. —, 1877
73874	— ad.	Murphy's	Winter, 1877

Family PTILOGONATIDÆ: The PTILOGONIES.

***9. Myiadestes townsendi**, (Aud.).—*Townsend's Solitaire.*

This appears to be a habitual visitant to Soda Springs in the fall, if not a summer resident, as I have found it common during each of several

* A similar confusion of names prevails to a considerable extent in many parts of the Eastern States, where, however, the bird most commonly confounded with the Mocking-bird is the Loggerhead Shrike, *Lanius ludovicianus*.—R. R.

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visits I have made to the place in different years, and once shot a young one there as early as August 1.

It is a rather rare summer resident at Big Trees, owing, probably, to the absence of its favorite food, the juniper-berry. Once, while calling a companion with a policeman's whistle, I heard a shrill note in the small oak-tree under which I stood. Looking up, I discovered the author of the note, a male of this species, which had evidently been attracted by the whistle, and was answering my call.

73610	♂ ad.	*Big Trees	May 4, 1877
73872	— ad.	Soda Springs	Autumn, 1877
73873	— ad.	do	Autumn, 1877
75312	— juv.	Big Trees	July 13, 1875

***10. Phainopepla nitens**, (Sw.).—*Black Ptilogony.*

This is a rather common summer resident of the chaparral belt, out of which I have not seen it. It was observed several times on July 4, between Milton and Murphy's. I shot a male near Jenny Lind, toward the close of the hunting season of 1874, not later than March 12. Early in April I have found it mated at Copperopolis, Calaveras Co.

Its manners are well described by Dr. Cooper in the Ornithology of California. The young in this collection was gorged with berries of the "wild coffee" of Murphy's, which differs slightly from that of Big Trees. This berry is about half an inch in diameter, very round, red just before ripe, black when ripe.

73534	♂ ad.	*Murphy's	Mar. 13, 1877
75313	— juv.	do	Aug. 29, 1878

Family SAXICOLIDÆ: The SAXICOLAS.

***11. Sialia mexicana**, Sw.—*Californian Bluebird.*

The Californian Bluebird is a common constant resident of the valleys and foot-hills, and is also common as high at least as Big Trees in summer. It arrives at Big Trees about the middle of May. There it is principally confined to the fields or meadows and their borders.

73879	♂ ad.	*Murphy's	Winter, 1877
73880	♂ ad.	do	Winter, 1877
73881	♂ ad.	do	Winter, 1877
73882	♂ ad.	do	Winter, 1877
76362	♂ juv.	*Big Trees	Aug. 20, 1878
76363	♂ juv.	do	Aug. 20, 1878
76538	♂ ad.	Murphy's	Winter, 1877

***12. Sialia arctica**, Sw.—*Rocky Mountain Bluebird.*

This bird is an irregular winter visitant to the foot-hills and valleys. It was first noticed at Stockton in the fall of 1878, on October 28. It was common in the following November, showing a partiality for fences along roads, sometimes perching on telegraph wires, seldom being seen on trees. A flock was seen March 12, 1878, thirty miles east of Stock-

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ton, and a few, principally young of the year, visited Big Trees, August 20 of this year (1878). It was abundant in the middle of September at Summit Meadows, and was quite common during the same month at Soda Springs. I did not see it at Marysville in the winter of 1877–78.

[Respecting the two species of Bluebirds, Mr. Belding writes, under date of January 15, as follows:—"Is it not remarkable that *S. mexicana* is now in the mountains and *S. arctica* in the lowlands? The former more common than the latter, at least when I left the valley. As snow is now two feet deep at Big Trees, *S. mexicana* has probably left."—R. R.]

73883	♂ ad.	Murphy's	Feb. 15, 1877
76539	♀ ad.	Stockton	Oct. 28, 1878

Family SYLVIIDÆ: The TRUE WARBLERS.

13. Regulus calendula, (Linn.).—*Ruby-crowned Kinglet.*

This is a very common winter sojourner in the foot-hills and valleys. I have not seen it at Big Trees in summer, though abundant at Soda Springs the last of August and afterward.

By the middle of April, 1878, it was very rare at Stockton. The first seen the following fall was on the 3d of October.

73877	♂ ad.	Murphy's	—— —, 1877

***14. Regulus satrapa**, Licht.—*Golden-crowned Kinglet.*

This bird was seen on several occasions at and near Big Trees in July and August, though not more than eight or nine in all. I had seen five or six at Soda Springs about October 1, 1877, and about the same number at Murphy's in December of the same year, but nowhere was it so numerous as at Stockton.

On the 15th of November, 1877, I found a flock of thirty or forty associated with a smaller number of *R. calendula*, and three days afterward saw a flock about as large about four miles from the spot where I had seen those on the 15th. These were also associated with a smaller number of *R. calendula*.

73535	♂ ad.	Stockton	—— —, 1877
75298	— juv.	* Moran's (altitude 3,800)	July 26, 1878
76540	♂ ad.	Stockton	Oct. 28, 1878
76541	♂ ad.	.... do	Nov. —, 1878

***15. Polioptila cœrulea**, (Linn.).—*Blue-gray Gnatcatcher.*

This is a rather common summer resident of Murphy's, and it was quite numerous at Marysville in June; at the former place frequenting the chaparral, at the latter, the willows. It was first seen at Murphy's April 5, 1878; at Stockton, March 23. It is rare at Stockton, and was not seen there during the breeding season. Several were seen here in August, 1877, but one was seen at Murphy's in parts of August and September.

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Last spring I heard a pair uttering cries of distress, and found upon proceeding to the spot a Blue Jay about to rob their nest. I shot the Jay, which was only about fifteen or twenty yards from me, when the male Gnatcatcher immediately came and perched on a bush not more than five or six feet distant, a little above my head, and poured forth a loud, cheery, musical strain of thankfulness (as it seemed to me), such as I did not think the little bird capable of producing.

A nest found at Murphy's was in the forks of a small pine-tree about fifteen feet from the ground, or less.

73878	♂ ad.	*Murphy's	Apr. 5, 1877
73884	♂ ad.	do	Apr. 5, 1877
76546	♂ ad.	Stockton	Mar. 23, 1878
76547	♂ ad.	Marysville	June —, 1878

Family PARIDÆ: The TITMICE.

***16. Lophophanes inornatus**, (Gamb.).—*Plain Titmouse.*

This bird is a common constant resident of the valleys and foot-hills. I have not seen it in the pine forests. A nest found at Stockton, May 29, was in the cavity of an elongated oak knot, eight feet from the ground. In drawing the nest out with a stick, the eggs were broken—the number was four, the color white.* The bird had been sitting about a week. While the nest was being taken, the occupant, having retreated to the central hollow of the trunk of the large oak of which the knot formed a part, appeared a few feet above me, and silently watched the proceedings.

73885	— ad.	Murphy's	Apr. 5, 1877
74256	♂ ad.	Stockton	Apr. 17, 1878
74257	♂ ad.	.....do	Apr. 9, 1878

***17. Parus montanus**, Gamb.—*Mountain Chickadee.*

This is a very common summer resident of Big Trees, and I have found it abundant at Soda Springs and Summit in the fall. Big Trees is nearly the lower limit of its breeding range.

I have found three nests, all in low, decayed stumps, two of them in a clearing, one in open forest. All were composed of wool, a considerable quantity of which had been used in their construction. The eggs are pure white.† Seven appears to be about the usual number. The young birds, when nearly ready to leave the nest, hiss, as their parents do, when disturbed on the nest.

In December, 1878, I saw a flock of this species at Copperopolis (alt. about 1,200 ft.), the first I have seen in the chaparral belt.

73886	— ad.	Big Trees	May —, 1877

*The eggs of this species, usually plain white, are sometimes, though rarely, spotted, like those of *L. bicolor*.—R. R.

†A curious fact; in all other American species of this genus, so far as known, they are heavily speckled with reddish brown.—R. R.

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***18. Psaltriparus minimus,** (Towns.).—*Least Tit.*

The Least Titmouse is a common constant resident of the valleys and foot-hills. A few flocks were seen at Big Trees in July and August, though only at rare intervals.* I have not seen it above Big Trees.

73887	— ad.	*Murphy's	Apr. —, 1877
73888	— juv.	....do	Apr. 20, 1877
74433	♀ ad.	*Stockton	May 8, 1878
75299	— ad.	Big Trees	July 13, 1878

Family SITTIDÆ: The NUTHATCHES.

***19. Sitta carolinensis,** *β.* **aculeata,** Cass.—*Slender-billed Nuthatch.*

This Nuthatch has not been abundant at any place where I have made collections, though often seen at all of them, especially in the pine forests. It was quite common in the groves of deciduous oaks near Stockton in May and the first week of June, 1878, and I supposed they had nests, but was unable to find them.

73608	♀ ad.	*Marysville	Jan. 5, 1878
73889	♂ ad.	Calaveras County	—— —, 1877
73890	♂ ad.	....do	—— —, 1877
73891	♀ ad.	....do	—— —, 1877
76258	♂ ad.	*Stockton	Apr. 9, 1878

***20. Sitta canadensis,** Linn.—*Red-bellied Nuthatch.*

This bird is abundant at Big Trees in summer, probably outnumbering the Robins or Jays. I found it rather rare at Soda Springs in the fall of 1877. It is occasionally seen at Murphy's in winter, and is a very rare winter visitant to the valleys.

73034	♂ ad.	*Big Trees	May 19, 1878
73892	♀ ad.	Murphy's	Mar. 3, 1877
73893	♀ ad.	....do	Mar. 3, 1877
76548	♀ ad.	Stockton	Nov. 5, 1878

***21. Sitta pygmæa,** Vig.—*Pigmy Nuthatch.*

This bird seems to be very rare in Central California. I first met with it at Big Trees in July, having been drawn to it by its notes. It was then associated with *S. canadensis.*

I saw it only on two occasions, in July and August, the total number seen being only about a dozen.

75300	— juv.	*Big Trees	July 25, 1878

Family CERTHIIDÆ: The CREEPERS.

***22. Certhia familiaris,** *β.* **americana,** Bonap.—*American Brown Creeper.*

This bird is an abundant summer resident at Big Trees, and is rather common in the fall at Soda Springs. It is a rare winter visitant to the

* Probably this and other species after breeding in the foot-hills, seeking to escape from the heat and drouth of midsummer, enter the cool shades of the cañons and streams which lead eastward and upward.

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valleys. I saw two of these birds at Marysville in January and February, 1878, and a pair was seen at Stockton October 27, 1878.

73899	—	ad.	Murphy's	Spring, 1877
73900	—	ad.	*Big Trees	Spring, 1877

Family CHAMÆIDÆ: The GROUND TITS.

***23. Chamæa fasciata,** Gamb.—*Ground Tit.*

This bird is a constant resident at Murphy's, Stockton, and Marysville. At the two latter places it inhabits the willow thickets, where, however, it is not numerous. It is very common at Murphy's in the chaparral thickets.

Its perfect spring song consists of three loud, high, staccato notes, immediately followed by a trill, starting in the same key, gradually descending about a minor third, the whole song occupying six or eight seconds of time.

73876	—	ad.	*Murphy's	Apr. —, 1877
74253	♀	ad.	*Stockton	Apr. 13, 1878
74254	♂	ad.	do	Apr. 2, 1878
74255	♂	ad.	do	Mar. 30, 1878

Family TROGLODYTIDÆ: The WRENS.

***24. Salpinctes obsoletus,** (Say).—*Rock Wren.*

The Rock Wren is a common constant resident at Murphy's. I have also seen it at Copperopolis, Calaveras Co., in April and December. I have not seen it in the pine forests.

73895	—	ad.	*Murphy's	Dec. —, 1877

25. Catherpes mexicanus, β. **conspersus,** Ridgw.—*Cañon Wren.*

This Wren was quite common at Murphy's in February and the first half of March, 1877. It was much given to penetrating the piles of broken rocks in the abandoned mining claims, and was with difficulty shot, and then at close range only. I have not seen it on the dry hills frequented by *Salpinctes obsoletus.* I have observed it only at Murphy's, at the time stated, and not elsewhere, though there is but little suitable ground where I have been. There are many places on the Calaveras River, in the chaparral belt, where it should be found, but these localities I have not visited in many years.

73035	—	ad.	Murphy's	Feb. 7, 1877

***26. Thryomanes bewicki,** β. **spilurus,** (Vig.).—*Californian Bewick's Wren.*

This Wren is an abundant constant resident at Marysville, where it inhabits the willow thickets along the streams. I have not found it

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abundant elsewhere, though it is rather common in spring at Murphy's, where it is occasionally seen in winter also.

At Marysville, in the summer of 1878, a pair of these birds raised a brood of young in a seam of one of the timbers of a railroad trestling, notwithstanding frequent jars from passing trains. The nest was about two feet below the rails.

73602	— ad.	Calaveras County	Jan. 5, 1878
73895	— ad.	*Marysville	Winter, 1877–8
73896	— ad.	....do	Winter, 1877–8
73897	— ad.	....do	Winter, 1877–8
73898	— ad.	....do	Winter, 1877–8
76542	— ad.	Stockton	May 8, 1877

***27. Troglodytes aëdon, β. parkmanni**, Aud.—*Parkmann's Wren.*

I have not seen more than a dozen of these birds while making this collection. Most of these were at Big Trees.

76364	—juv.	*Big Trees	July —, 1878
76543	—juv.	Stockton	June 3, 1878
76544	—juv.	....do	Oct. 28, 1878

28. Troglodytes hyemalis, β. pacificus, Baird.—*Californian Winter Wren.*

77078	— ad.	Murphy's	Jan. 6, 1879
77079	— ad.	....do	Jan. 6, 1879

***29. Telmatodytes palustris, β. paludicola**, Baird.—*Western Long-billed Marsh Wren.*

This Wren is an abundant constant resident of the tule marshes near Stockton. In the breeding season I have examined more than twenty nests without finding an egg, though the anxious or angry owner or owners would follow me closely, constantly scolding, as I examined each nest, as though having an equal interest in all.

73839	— ad.	Marysville	Dec. —, 1877
74432	— ad.	*Stockton	June —, 1878
76545	—juv.	....do	Sept. 29, 1878

Family MOTACILLIDÆ: The WAGTAILS and TITLARKS.

30. Anthus ludovicianus, Gmel.—*American Titlark.*

The Titlark is a common winter sojourner of the valleys and foot-hills. I saw a flock of these birds near Murphy's, 3,400 feet above the sea, on the 10th of December, 1877. It left Stockton about May 1, 1878, and returned September 18 of the same year, at which time it was only found in the edge of the tule swamp, but soon became distributed through the surrounding country. It has not, up to the present time (November 27), appeared in the streets, as is its usual custom in winter.

73875	— ad.	Murphy's	Mar. 3, 1877
76549	— ad.	Stockton	Sept. 18, 1878

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Family MNIOTILTIDÆ: The AMERICAN WARBLERS.

***31. Helminthophaga ruficapilla,** (Wils.).—*Nashville Warbler.*

This Warbler arrived at Murphy's April 11, 1877, and was rather common the remaining portion of the month, frequenting the deciduous oaks on sunny hillsides, outnumbering at that time any of the Warblers except *D. auduboni*. In the pine forests it frequents low bushes.

A nest found at Big Trees in May was built on the ground in a thick growth of an evergreen shrub. It was formed of pine-root fibres, and contained five eggs, white, thickly spotted with reddish brown, mostly concentrated on the large end, forming a prominent ring.

It does not breed much below Big Trees—I have not seen it in the valley, its range extending from 2,500 feet upward.

73036	♂ ad.	Murphy's	Apr. 1, 1877
73037	♂ ad.	do	Apr. 1, 1877
73038	♂ ad.	*Big Trees	May —, 1877
73624	♀ ad.	Soda Springs	Autumn, 1877
73536	♂ ad.	Murphy's	—— —, ——
75308	— juv.	Big Trees	July 16, 1878
75309	— juv.	do	July 16, 1878

***32. Helminthophaga celata, β. lutescens,** Ridgw.—*Californian Orange-crowned Warbler.*

This bird was first noticed at Murphy's on the 20th of April, 1877, and was rather common until about May 1. A few were seen at Stockton April 22, 1878, after which time it was rarely seen—in no instance after May 10.*

A few were seen on different occasions in January and February, 1878, in the wild-grape and brier patches of the bottom-lands near Marysville.

In spring it feeds among the deciduous oaks. Later in the season, in the pine forest, it is confined to low shrubbery.

It is a common summer resident of Big Trees,† and is abundant at Soda Springs in fall.

73613	— juv.	*Big Trees	May —, 1877
73614	— ad.	Marysville	Jan. 8, 1878
73925	— ad.	Soda Springs	Autumn, 1877
73926	— juv.	do	Autumn, 1877
74006	— juv.	Big Trees	May —, 1877
73791	♂ ad.	Marysville	Feb. 1?, 1878
76550	♀ ad.	Stockton	Apr. 22, 1878

***33. Dendrœca æstiva,** (Gmel.).—*Yellow Warbler.*

This well-known species is common in the valleys and foot-hills in summer, and is often met in the pine forests during the same time, where it is principally confined to the willows and aspens in and around meadows. It arrived at Murphy's April 26, 1877, and at Stockton April 15, 1878, at which time Mt. Diablo and the "Coast Range" were white

*Under date of December 28, 1878, Mr. Belding writes that it was then found at Stockton, but was rare.—R. R.

†Its breeding range scarcely extends below this altitude.

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with an unusually late fall of snow. It left Stockton previous to September 7, 1878.

73908	— ad.	*Big Trees	Spring, 1877
73909	— ad.	do	Spring, 1877

34. Dendrœca coronata, (Linn.).—*Yellow-rump Warbler.*

This species appeared to be quite abundant at Murphy's in December, 1877. *D. auduboni* was also present, but less numerous than this species, though their similarity at this season rendered their positive identification difficult. It was also found at Marysville in January and February, 1878, but it appeared to be less numerous than *D. auduboni*. In February it and many other small birds wore yellow throats and breasts, which they acquired by feeding among the willows, which had just blossomed.

73790	— ad.	Marysville	Feb. —, 1878
73912	— ad.	do	Feb. 15, 1878
73913	— ad.	Murphy's	Dec. —, 1877
73914	— ad.	do	Dec. —, 1877

***35. Dendrœca auduboni**, (Towns.).—*Audubon's Warbler.*

This bird is a very common winter sojourner in the valleys and foothills. It undoubtedly breeds at Big Trees, where I have seen its young scarcely able to fly, though at this time rather rare. It was abundant at Soda Springs and Summit about October 1, 1877. It left Stockton during the first week of May, 1878, in very warm weather, and returned September 18. By October 6 it was common.

It appears to be unable to endure very cold weather, as during a freezing spell at Marysville, in January of this year (1878), it was often found unable to fly. One that I found in the streets in this condition was soon restored by being warmed. Several dead ones were found in the city.

73910	♂ ad.	Murphy's	Spring, 1877
73911	♂ ad.	do	Spring, 1877
74441	♂ ad.	Stockton	Apr. 25, 1878
76375	♂ ad.	*Big Trees	July 7, 1878

***36. Dendrœca occidentalis**, (Towns.).—*Yellow-headed Gray Warbler.*

This species was more numerous at Big Trees in July, 1878, than all the other *Dendrœcæ* combined, and was rather common at Soda Springs in August and September, 1877. In July and August, at Big Trees, it was usually in the evergreens, though it was often, at all hours of the day, in a thin strip of willows in the meadow, having apparently been drawn there as much by the abundance of insects which swarmed in the willows as by the water that flowed through them. There they would allow me to go within a few yards of them, and were slow in learning to fear a gun.

At Big Trees, in May, 1877, this species frequented the deciduous oaks,

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and I rarely saw it anywhere else: one was observed on the bare ground, moving deliberately about the end of a decayed log. In its movements it somewhat resembles the Nashville Warbler, and it is not shy, compared with most birds. At Soda Springs it was quite common, keeping generally under forty or fifty feet from the ground, though they sometimes go from the lower to the upper limbs of tall trees by short flights, especially if the sun is shining only on the tree-tops.

I recognized but two at Stockton: these were in the willows on the natural levee of the San Joaquin River.

73039	♂	ad.	*Big Trees	May 20, 1877
73040	♀	ad.	do	May 20, 1877
73920	♂	ad.	do	May 20, 1877
73921	♀	ad.	do	May 20, 1877
73922	—	ad.	Soda Springs	Autumn, 1877
74439	♂	ad.	Stockton	May 9, 1878
74440	♀	ad.	do	May 18, 1878
75303	.....		Big Trees	July 8, 1878
75304	♀	juv.	do	Aug. 24, 1878
75305	—	juv.	do	July 17, 1878
75306	—	juv.	do	July 5, 1878
75307	—	juv.	do	July 25, 1878
.....	.....		do	July 16, 1878

37. Dendroeca townsendi, (Nutt.).—*Townsend's Warbler.*

I have not noticed anything peculiar in the habits of this bird. Those I have seen were unsuspecting, and rather slow in their movements, being much like *D. nigrescens* in this respect.

I shot what I supposed was a female of this species near Stockton, June 3, 1878, but did not find it.

The specimens in the collection are all I positively identified at Stockton in the spring of 1878.

73919	—	ad.	Soda Springs	Autumn, 1877
74251	♂	ad.	Stockton	Apr. 29, 1878
74437	♂	ad.	do	Apr. 29, 1878
74438	♀	ad.	do	May 17, 1878

***38. Dendroeca nigrescens**, (Towns.).—*Black-throated Gray Warbler.*

This bird arrived at Murphy's April 15, 1877; at Stockton April 17, 1878. It is a summer resident of Big Trees, though far from abundant there or at any of the places where I have found it. It was more numerous in August than in July, though it seemed to be constantly present during both months. It disappeared from Soda Springs about the middle of September, 1877, or rather it was not seen after my return from the Summit, September 22, and was rare when I left on the 15th.

73915	—	ad.	Soda Springs	Fall, 1877
73916	—	ad.	do	Sept. —, 1877
73917	—	ad.	Murphy's	Apr. 15, 1877
73918	—	ad.	*Big Trees	June —, 1877
75301	—	ad.	do	Aug. —, 1878
75302	—	ad.	do	Aug. —, 1878
76551	♀	ad.	Stockton	May 1, 1878

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***39. Geothlypis trichas,** (Linn.).—*Maryland Yellow-throat.*

Two or more of these birds were seen at Marysville January 2, 1878, and occasionally thereafter until about the middle of the month, when their favorite cover was flooded by the Yuba River. It was not seen at Stockton during the following March, nor until April 12, soon after which it became abundant in the thickets near water and in the edges of tule swamps near sloughs. It was also found there in December, 1878, but was rare. I have not seen it in the mountains.

It became rare at Stockton after about November 1, 1878.

74263	♂ ad.	*Stockton	Apr. 13, 1878
76552	♂ juv.	....do	Dec. 3, 1878

***40. Geothlypis macgillivrayi,** (Aud.).—*Macgillivray's Warbler.*

I have not seen this bird below an altitude of about 3,800 feet. It is rather common at Big Trees in the summer months, but was rare at Soda Springs in September. It is seldom, if ever, found out of low shrubbery in the Sierras.

73923	— ad.	*Big Trees	June 8, 1877
75310	— juv.	....do	July 22, 1878
75311	— juv.	....do	July 22, 1878

***41. Icteria virens,** *β.* **longicauda,** Lawr.—*Western Yellow-breasted Chat.*

This is a very common summer resident at Stockton, especially in the thickets along the rivers, which it follows into the mountains as high as Murphy's. I first noticed it at Stockton on May 9. It left previous to September 7.

73905	— ad.	*Murphy's	June 9, 1877
74434	♂ ad.	*Stockton	May 9, 1878
74435	♂ ad.	....do	May 13, 1878

42. Myiodioctes pusillus, *β.* **pileolata,** (Pall.).—*Californian Black-capped Green Warbler.*

Arrived at Murphy's April 18, 1877. It was first seen at Stockton May 6, 1878. The last seen during the spring migration was on May 27. Between the dates given it had been abundant in the willows along the San Joaquin River.

At Big Trees it was common from about the middle of May to June 8, 1878, while at Soda Springs it was abundant in fall. I did not find it at Big Trees from July 4 to August 4, though after this it was common.

It is usually found among low bushes in the pine forests, but, like many other birds, frequents deciduous oaks when the leaves are young.

73906	— ad.	Murphy's	Apr. —, 1877
73907	— ad.	....do	Apr. —, 1877
74436	♀ ad.	Stockton	May 9, 1878
76553	♂ ad.	Murphy's	Apr. —, 1877

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Family HIRUNDINIDÆ: The SWALLOWS.

***43. Progne subis,** (Linn.).—*Purple Martin.*

Though common or even abundant in Stockton in the spring of 1878, it was seldom seen in the surrounding country, and then only when birds domiciled in town had wandered a short distance from home.

It arrived at Murphy's in 1877 on March 13; in 1878, at Stockton March 16. It left Murphy's previous to August 27, 1878, and Stockton previous to September 6, 1878. I have not seen it in the pine forests.

73973	♂ ad.	Murphy's	Mar. 15, 1877

***44. Petrochelidon lunifrons,** (Say).—*Cliff Swallow.*

A few of these birds were occasionally seen at Big Trees in July. It was rare at Murphy's about September 1, and I did not find it at Stockton on or after September 6. It is abundant at both the latter places during the breeding season.

At Stockton it builds under the eaves of buildings; at Murphy's, in the limestone boulders exposed by mining.

It arrived at Murphy's March 15, 1877; at Stockton March 17, 1878; and at North American Hotel March 12, 1878. On the morning of the 13th, at the latter place, four or five of them occupied a solitary old nest under the gable of the hotel, and forty or fifty of their fellows were flying and twittering around as though trying to dislodge them.

73974	— ad.	*Murphy's	Mar. 15, 1877

***45. Hirundo erythrogastra, β. horreorum,** Barton.—*Barn Swallow.*

The Barn Swallow is common at Stockton, Murphy's, and Big Trees in summer, many of them breeding at these places, and was the only Swallow seen at Stockton from September 6 until October 7, when a flock of *Tachycineta bicolor* was observed.

It arrived at Murphy's March 15, 1877, and at North American Hotel, 30 miles east of Stockton, March 12, 1878, while it was first noticed at Stockton, March 20, 1878. It disappeared from the latter place about October 15, 1878.

At Big Trees, Dunbar's, and Moran's Meadows, it frequented barns and other buildings, and did not seem to be generally distributed through the forest.

73977	♂ ad.	*Murphy's.....	Mar. 15, 1877

***46. Tachycineta bicolor,** (Vieill.).—*White-bellied Swallow.*

This bird was seen at Marysville February 1, 1878, and nearly every day thereafter until March 5. During the following March and April it was very abundant at Stockton, flying over the country in all direc-

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tions, especially over the tule swamps. In May, when it was less abundant, I noticed two nests in casings over doors of private dwellings.

I have not recognized it at Murphy's or Big Trees. A large scattered flock was seen at Stockton as late as December 5, 1878.

73976	— ad.	*Marysville	Feb. —, 1878
76554	♂ ad.	Stockton	Oct. 15, 1878
76555	♀ juv.	....do	Oct. 15, 1878
76556	— ad.	....do	Oct. 15, 1878
76557	— ad.	....do	Oct. 15, 1878
76558	♂ ad.	....do	Oct. 12, 1878

***47. Tachycineta thalassina**, (Swains.).—*Violet-green Swallow.*

This beautiful bird was first recognized August 7, at Dunbar's Mill, where at least a hundred were in sight. Three days afterward it was seen flying over the meadows at Big Trees, and thereafter nearly every day until August 27, 1878.

They chose as a resting place the top branches of a tall dead pine near the hotel, out of shooting range, and often when flying were so high as to be seen with difficulty; occasionally, however, they mingled with the Barn Swallows near the ground.

75314	♂ juv.	*Dunbar's Mill (alt. 3,800 ft.)	Aug. 7, 1878
75315	— juv.	.... do	Aug. 7, 1878
76559	♂ ad.	*Big Trees	Aug. 10, 1878

48. Stelgidopteryx serripennis, (Aud.).—*Rough-winged Bank Swallow.*

This bird arrived at Murphy's March 15, 1877, and remained until May 3, and probably later. They constituted only a fraction of the multitude of Swallows of the place, and were, perhaps, altogether not more than two dozen in number. I have not seen it elsewhere.

73975	— ad.	Murphy's	Mar. 15, 1877

Family VIREONIDÆ: The VIREOS, or GREENLETS.

***49. Vireosylvia gilva**, *β.* **swainsoni**, Baird.—*Western Warbling Vireo.*

This bird I have found at all places where I have collected in summer, but nowhere abundant. It arrived at Murphy's April 26, 1877, and at Stockton May 1, 1878.

It was rare at Murphy's about September 1, and was not seen at Stockton on or after the 7th of that month.

73043	— ad.	*Big Trees	May —, 1877
73901	— ad.	*Murphy's	Spring, 1877
73902	— ad.	....do	Spring, 1877
73903	— ad.	....do	Spring, 1877
73904	— ad.	....do	Spring, 1877
74442	♂ ad.	*Stockton	May 1, 1878

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***50. Lanivireo solitarius, β. cassini,** Baird.*—*Cassin's Vireo.*

This bird is a common and generally distributed summer resident at Big Trees. I have here found it more abundant than at any other place. I often saw it at Soda Springs in the last of August and the first half of September, and it was quite common in the willows near Marysville in June. At Stockton, it was seen in the willows along the San Joaquin River, about the middle of May only, the entire number being but four or five. In May and June, 1877, at Big Trees, its sweetly expressive song was more attractive to me than the song of any bird of that locality.

About the first of June I found a nest of this species at the Big Trees. The bird remained on it until my eye was within three feet of her head, so that I had a good view of her. I think large numbers breed at the Big Trees and vicinity, as they were very numerous June 8, when I left there.

73041	♂ ad.	*Big Trees	May 10, 1877
73042	♂ ad.	..... do	May 10, 1877
73537	— ad.	Big Trees	May —, 1877
74445	♂ ad.	*Marysville	June 13, 1878
74446	♂. ad.	.. do	June 14, 1878
74447	— ad.	Stockton	May 9, 1878

51. Vireo huttoni, Cass.—*Hutton's Vireo.*

This bird appears to be very rare in Central California. I found five or six of them in the willows at Marysville, January 20, 1878, and a few days later saw two or three others.

71838	— ad.	Marysville	Jan. 20, 1878
76368	— ad.	Big Trees	Jan. 20, 1878

***52. Vireo pusillus,** Coues.—*Least Vireo.*

This very interesting little bird is common in summer in willow thickets at Stockton and Marysville. It arrived at Stockton about April 15, 1878, and left before September 7. It is active, restless, noisy or musical, and does not fail to make its presence known, occasionally giving its tail a side jerk, reminding one, in this respect, of the small Fly-catchers. When a nest is being built, the male does all the singing and the female all the work, though the former encourages the latter with its presence as well as song.

A nest taken May 28 had three eggs in it; on the 24th or 25th it had two. I think this pair had a nest destroyed by cattle, though there could not have been more than one or two eggs in it; but those eggs

* Having recently, in conjunction with Mr. Henshaw, carefully studied the Western specimens heretofore called by us and others *L. solitarius*, I have been unavoidably led to adopt Mr. Henshaw's conclusion that *L. solitarius* proper does not occur at all in the West, being replaced in the Pacific Province by *L. cassini*, and in the Middle Province by *L. plumbeus*. My note in the Bulletin of the Nuttall Ornithological Club (vol. iii, No. 2, pp. 65, 66), regarding the asserted occurrence of *solitarius* in California, based upon Mr. Belding's specimens, therefore refers solely to *cassini*. Mr. Henshaw's views, shortly to be published, will explain the matter more fully.—R. R.

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should be added to these if my surmises are correct. When the lining of cattle hair had been placed in the nest I supposed the nest complete; the lining of down was added and finished in about an hour. They lingered near the spot long after the nest was taken.

74259	♂ ad.	*Stockton	Apr. —, 1878
74260	♂ ad.	....do	Apr. —, 1878
74261	♂ ad.	....do	Apr. —, 1878
74262	♂ ad.	....do	Apr. —, 1878
74443	♂ ad.	*Marysville	June 12, 1878
74444	♂ ad.	Stockton	May 18, 1878
76562	♀ ad.	Marysville	June 13, 1878
76563	♀ ad.	Stockton	May 11, 1878

Family LANIIDÆ: The SHRIKES.

53. Lanius borealis, (Vieill.).—*Great Northern Shrike.*

This Shrike was comparatively common at Marysville in the winter of 1878. It was generally confined to willow thickets.

73615	— ad.	Marysville	Jan. 2, 1878
73616	— ad.	....do	Jan. 8, 1878
76564	— ad.	....do	Feb. 5, 1878

***54. Collurio ludovicianus**, (Linn.).—*Loggerhead Shrike.*

This Shrike was rather common at Marysville in January and February, and appeared to be the prevailing type of the species at that time and place.

The only Shrike seen at Summit Meadows (fall of 1877) was the juv. in this collection.

NOTE.—The Loggerhead Shrikes collected by Mr. Belding include two forms: a dark-colored style, like true *ludovicianus* of the Gulf States, only, in some specimens, even darker, and one with lighter colors generally, and nearly white upper tail-coverts. None of the latter, however, are the true "*excubitorides* type."—R. R.

73617	— ad.	Marysville	Jan. —, 1878
73618	— ad.	....do	Jan. —, 1878
73972	—juv.	*Summit Meadows	Sept. 16, 1877

54 *a*. Collurio ludovicianus, *β*. excubitorides, (Swains.).—*White-rumped Shrike.*

This appears to be the form which is resident at Stockton and Murphy's, and is very common in the intervening country.

In May, 1877, two White-rumped Shrikes were seen at Big Trees.

73971	— ad.	*Murphy's	Dec. —, 1877
76575	♂ ad.	Marysville	Feb. 20, 1878
76576	♂ ad.	....do	Feb. 22, 1878
76577	— ad.	Stockton	Apr. 1, 1878
76578	♂ ad.	....do	Apr. 9, 1878
76579	— ad.	....do	Nov. 8, 1878

Family AMPELIDÆ: The WAX-WINGS.

55. Ampelis cedrorum, (Vieill.).—*Cedar Wax-wing.*

The Cedar-bird is sometimes found in the extensive orchards of Marysville, and may also visit those of Stockton, but I have not seen it at the latter place.

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Dr. Davenport, of Stockton, has ten specimens, which he got about June 1 at Camp Seco, Calaveras County.

The people of Camp Seco say that these birds visit that place only when the cherries are ripe, when they come down from the mountains.

76560	♂ ad.	Camp Seco.....	Last of May, 1878*
76561	♀ ad.	.....do	

Family TANAGRIDÆ: The TANAGERS.

***56. Pyranga ludoviciana,** (Wils.).—*Western Tanager.*

This handsome bird is a common summer resident of Big Trees, where it is generally distributed through the forest. It is quite common at Soda Springs in August and September, less common in the latter than in the former month. About September 1, I noticed several flocks or families of three or four, all of them females or young of the year, at Murphy's. These were in the scattered oaks in the chaparral, feeding on the "wild coffee." It breeds but little below Big Trees.

73982	♂ ad.	Murphy's.....	Apr. 30, 1877
73983	♂ ad.	*Big Trees.....	June —, 1877
73984	♂ ad.	.....do	June —, 1877
73985	♀ ad.	.....do	June —, 1877

Family FRINGILLIDÆ: The FINCHES.

57. Loxia curvirostra, β. americana, Wils.—*American Red Crossbill.*

October 7, 1877, I saw at Summit Meadows what I am tolerably certain was a flock of these birds, and shot one, which I did not get, as it lodged in a tree; do not think I have seen it at any other time.

58. Hesperiphona vespertina, (Cooper).—*Evening Grosbeak.*

A flock of these birds was observed at Soda Springs, August 25, 1877, and flocks were occasionally seen in September, though they were not numerous. A few years since I saw a fine adult male at Lake Tahoe previous to August 1. Except upon these occasions, I do not remember having met with it.

73538	♂ ad.	Soda Springs.....	†Sept. —, 1877
73792	♀ juv.	.....do	Sept. 10, 1877

***59. Pinicola enucleator, β. canadensis,** (Briss.).—*Pine Grosbeak.*

A few of these birds were at Soda Springs in September, 1877. This is the only place where I have seen them.

73539	♂ juv.	Soda Springs.....	Sept. 22, 1877

* These specimens, shot from a flock of 16, were collected by Dr. E. C. Davenport.

†The latter part of the month.

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***60. Carpodacus cassini**, Baird.—*Cassin's Purple Finch.*

This bird probably sometimes breeds at Big Trees, as I found it there from May 3, 1877, to June 8, though it was apparently not there in July or August of 1878. It was abundant at Summit Meadows, August 25 and September 21, 1877, and was often seen at Soda Springs in August and September of the same year. I have not seen it below Big Trees.

73048	♂ ad.	*Big Trees	June 8, 1877

***61. Carpodacus purpureus, β. californicus**, Baird.—*Californian Purple Finch.*

This is an abundant species at Murphy's in winter, and at Big Trees in summer. I did not see it at Soda Springs nor at Summit Meadows in the fall of 1877. It rarely visits the valleys in winter. A flock of thirty or forty visited Marysville in February, 1878, snow at that time lying unusually low on the mountains.

It left Murphy's about the last of March, 1877; but a few returned April 17, during a slight fall of snow. At Murphy's it frequents chaparral in the pine forest—the evergreens usually—though sometimes it is on the ground feeding on seeds of plants.

73829	— ad.	Marysville	Feb. —, 1878
73927	♂ ad.	Murphy's	Apr. —, 1877
73928	♀ ad.	*Big Trees	May —, 1877
73929	♀ ad.	.....do	May —, 1877
73930	♀ ad.	.....do	May —, 1877
73931	♀ ad.	.....do	May —, 1877
74269	♀ ad.	Stockton	May 1, 1878
76571	♂ ad.	Big Trees	July —, 1878

***62. Carpodacus frontalis, γ. rhodocolpus**, Caban.—*Californian House Finch.*

This is an abundant constant resident of the valleys and foot-hills of this region. I have seen a large flock in December during very mild weather, nearly a thousand feet above Murphy's, although very few breed above that place.

73932	♂ ad.	*Murphy's	Spring, 1877
73933	♂ ad.	.....do	Spring, 1877
73934	♀ ad.	.....do	Spring, 1877
74448	♂ ad.	*Stockton	June 8, 1878
76570	♂ ad.	.....do	Oct. 9, 1878

***63. Chrysomitris tristis**, (Linn.).—*American Goldfinch.*

The Thistle-bird is a common constant resident of Stockton and Marysville, being quite abundant at the latter place in winter. I have not seen it above Murphy's.

73630	— ad.	Murphy's	Jan. —, 1878

***64. Chrysomitris psaltria**, (Say).—*Green-backed Goldfinch.*

This bird is an abundant constant resident of Murphy's. It was constantly present at Big Trees in July and August, though not numerous. It was also seen at Dunbar's and Moran's Meadows (altitude 3,800 feet)

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during the same time. In the pine forest I have seen it only in and near cultivated fields.

It seems to be a rather rare winter sojourner of the valleys and an accidental summer visitant to them. A small flock was observed in Stockton May 16, 1878.

73937	♂ ad.	*Murphy's	Feb. 6, 1877
73794	♂ ad.	Marysville	—, 1878
73795	♂ ad.	do	—, 1878
73796	♂ ad.	do	—, 1878

*** 65. Chrysomitris lawrencii,** Cass.—*Lawrence's Goldfinch.*

This does not seem to be an abundant species in any part of this region. It was first noticed at Murphy's March 21, 1877, from which time until May 3 flocks of three or four were occasionally seen, but the total number was not more than fifty.

At Marysville, winter of 1877–78, only a dozen or less were seen. I have not seen it above Murphy's, where it was generally found in the chaparral, sometimes in low trees (pines or oaks), occasionally on the ground.

73629	— ad.	*Marysville	Jan. 9, 1878
73935	♂ ad.	*Murphy's	Mar. 12, 1877
73936	♂	do	Mar. 12, 1877

*** 66. Chrysomitris pinus,** (Wils.).—*Pine Goldfinch.*

A few of these birds were probably breeding at Big Trees in July and August, 1878, and I noticed it at Soda Springs August 28, 1877.

At Murphy's, in December, 1877, I found a flock of a dozen or more familiarly associated with a larger number of *C. psaltria*, feeding on the ground on a rocky hill. They were seen for six or seven consecutive days, or as long as I remained at Murphy's, and appeared to associate in perfect harmony. At Marysville I found, a few weeks later, both species again as familiarly associated. In this case there were but three *C. pinus*, with about twice their number of *C. psaltria*, all sitting on a telegraph wire along the railroad track. They soon alighted on the track near me, four of them forming a group by themselves not covering more than a square foot of ground. Two of this group were *C. pinus*, which I shot, leaving a single survivor of this species among those remaining.

A few days after this, near the same spot, on February 23, I saw a single specimen of *C. pinus* familiarly associated with a flock of *C. tristis*, feeding among the short grass in a pasture about two hundred yards from a willow thicket; perhaps this was the surviving *C. pinus* above mentioned.

I am pretty certain they were breeding there, for many times I saw single birds come to a spring, and depart in the direction from which they came.

73540	— ad.		—, 1877
73796	— juv.	Marysville	—, 1878
76366	♀ ad.	*Big Trees	Aug. 10, 1878

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67. Passerculus sandvichensis, γ. alaudinus, (Bonap.).—*Western Savannah Sparrow.*

This appears to be the only *Passerculus* found in this region. At Stockton its first and last resorts appear to be the margins of the tule swamps, though nearly all the time while remaining it is distributed throughout the country, in stubble-fields, closely grazed pastures, on fences, often in trees—in fact, everywhere.

It left Stockton about May 1, 1878, and returned September 18. It is a common winter sojourner at Murphy's.

73625	— ad.	Summit of Sierra Nevada, lat. 39°	.....
73626	— ad.	Marysville?	—— —, 1878
73627	— ad.	.....do	—— —, 1878
73051	♂ ad.	Murphy's	Apr —, 1877
74264	♂ ad.	Stockton	Apr. 27, 1878
74265	♀ ad.	.....do	Apr. 27, 1878
73799	— ad.	Marysville	—— —, 1878
73800	— ad.	.....do	—— —, 1878
76572	— ad.	Stockton	Sept. 18, 1878
76573	— ad.	.....do	Sept. 24, 1878

68. Pœcetes gramineus, β. confinis, Baird.—*Western Grass Bunting.*

This appears to be a rare species in Central California. A few individuals were scattered in the pastures at Summit Meadows in September, 1877. I have not recognized it elsewhere.

73542	— ad.	Summit Meadows	Sept. —, 1877

***69. Chondestes grammica,** (Say).—*Lark Bunting.*

This bird is a common constant resident of the valleys and foot-hills, as high as Murphy's. It was seen in the meadows near Big Trees (altitude 3,800 feet) in July and August, 1878.

73541	— ad.	*Murphy's	Feb. —, 1877

70. Zonotrichia leucophrys, (Forst.).—*White-crowned Sparrow.*

While collecting near Summit Meadows in September, 1877, I found a flock of fifteen or twenty of these birds. Something in their movements, perhaps their tameness (for *Z. intermedia* was unaccountably wild), induced me to survey them through a field-glass, which resulted in their identification. I saw them nearly every day of the following week, at nearly the same spot, at times associated with *Z. intermedia*, but usually separated from them.

73543	— ad.	Summit Ice Lakes	Sept. 16, 1877
73928	— ad.	Summit Ice Lakes, 1 mile south of Summit Meadows.	Sept. 16, 1877
73929	— ad.	.....do	Sept. 16, 1877

71. Zonotrichia intermedia, Ridgw.—*White-lored White-crowned Sparrow.*

This bird was very abundant at Summit Meadows and Soda Springs in the fall of 1877. I have not seen it at Big Trees in summer.

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This appears to be the form of the White-crowned Sparrow which is abundant at Murphy's in winter. It left there about the middle of April in 1877.

73926	— ad.	Murphy's	Winter, 1877
73927	— ad.	....do	Winter, 1877
76585	— ad.	Stockton	Apr. 13, 1878
76586	— ad.	....do	Apr. 26, 1878
76587	— ad.	....do	Apr. 26, 1878

72. Zonotrichia coronata, (Pall.).—*Golden-crowned Sparrow.*

This bird is an abundant winter sojourner of the valleys and foot-hills. It left Stockton about May 1, 1878, and returned about October 21, soon after which it was abundant. It departed from Murphy's about the 15th of April in 1877.* I have not seen it in the pine forests, though it probably migrates through them.

73950	♂ ad.	Murphy's	Winter, 1877–78
73951	♀? ad.	....do	Winter, 1877–78

***73. Junco oregonus**, (Towns.).—*Oregon Snowbird.*

This bird is very common at Stockton, Murphy's, and Marysville in winter, and breeds at Big Trees, but not much below that point. It was first noticed at Stockton on the 25th of October in 1877. It was last seen at the latter place April 25, 1878, but during this month it was rare.

73952	♂ ad.	Stockton?	Nov. —, 1877?
73953	♀ ad.	Murphy's?	Spring, 1877

74. Amphispiza belli, (Cass.).—*Bell's Sparrow.*

The specimen in the contribution of February 11, 1879, is one of a pair of these birds, shot at Murphy's February 1, 1879. They were on a high, steep hill, which was thickly covered with a stunted growth of cedar chaparral, or chemisal, the same hill where I found the specimen of *Peucæa ruficeps*. As soon as I saw them I knew they were strangers to me, and thought they were *A. belli*. This species is a good singer.

75. Spizella socialis, β. arizonæ, Coues.—*Western Chipping Sparrow.*

This bird arrived at Murphy's April 11, 1877, soon after this time becoming very common. I first found it feeding in the deciduous oaks on the hillsides, but a few days later it was seen in gardens.

Many breed at Big Trees, where, in 1877, they arrived previous to May 15.

It was unexpectedly rare at Stockton in the spring and summer of 1878. The first seen at this place in the spring of this year was on May 1. None were seen in the fall after September 6.

73544	— ad.	Soda Springs	Sept. —, 1877
73628	— ad.	*Calaveras County	Spring, 1877
74449	♂ ad.	*Stockton	Apr. 30, 1878
73938	— ad.	Calaveras County	Spring, 1878
76589	— juv.	Marysville	June 15, 1878

* The spring of 1877 was considerably earlier than that of 1878.

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76. Spizella breweri, Cass.—*Brewer's Sparrow.*

Brewer's Sparrow is undoubtedly abundant in the higher Sierras in summer, though I did not find it at Big Trees in July and August.

I saw but two specimens at Stockton during the spring of 1878.

73939	— ad.	Soda Springs	Sept. —, 1877

77. Melospiza fasciata, γ. guttata, (Nutt.).—*Rusty Song Sparrow.*

This was an abundant species at Marysville in the winter and spring of 1878, as late as March 5, and probably later. It was quite generally distributed among the weeds and grass of corn-fields in the bottom-lands, as well as along sloughs, being strikingly different from *M. heermanni* in this respect. It is a winter sojourner of Murphy's, where it is restricted to edges of ponds.

It was first seen at Stockton (in the fall of 1878) on November 14. Here I saw no more than one specimen of this species in the spring (1878), and three or four in the fall of the same year (to November 28). The latter appeared to be migrating, and one of them was found in wheat-stubble two or more miles from a slough.

73619	— ad.	Marysville	Jan. —, 1878
73050	♂ ad.	Murphy's	Mar. 20, 1877
76574	— ad.	Marysville	Feb. —, 1878
76575	— ad.	....do	Winter, 1878

77 *a*. Melospiza fasciata, *δ*. fallax, Baird.—*Rocky Mountain Song Sparrow.*

While collecting at Marysville in winter, I often at first glance mistook for *M. lincolni* what may have been this species. This confusion lasted but two or three weeks, however. Later in the season I tried to duplicate the specimens I had shot, but was unable to do so.

73621	— ad.	Marysville	Jan. —, 1878
76576	— ad.	....do	Jan. —, 1878
76577	— ad.	....do	Jan. —, 1878
76578	— ad.	....do	Feb. —, 1878
76579	— ad.	Stockton	Mar. 22, 1878
76580	— ad.	....do	Nov. 17, 1878

***77 *b*. Melospiza fasciata, *ζ*. heermanni**, Baird.—*Californian Song Sparrow.*

This is an abundant resident of Stockton, and appears to be equally abundant in summer and winter. I have seen two nests in the tule marshes made entirely of flags, while those I found on solid ground were made of grass or weeds, lined with fine grass.

It is the only *Melospiza* found here in summer, and almost the only one in winter.

73620	— ad.	Stockton	July —, 1877
74271	♂ ad.	*do	Apr. 27, 1878
74272	— ad.	....do	Mar. 29, 1878
74273	— ad.	....do	Nov. —, 1877
74274	♂ ad.	....do	Apr. 20, 1878
73797	— ad.	....do	.....
73798	— ad.	....do	.....
76581	— ad.	....do	Nov. 17, 1878
76582	— ad.	Murphy's	Dec. 18, 1877
76583	— juv.	Stockton	Sept. 19, 1878

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78. Melospiza lincolni, (Aud.).—*Lincoln's Sparrow.*

This bird was common at Marysville in the winter and spring of 1878. It frequented the thick dead grass at the edge of sloughs.

The first I had seen the previous fall at Soda Springs was on the 2d of October. It was found at Summit Meadows October 7, 1877. At Big Trees I have seen it in May. At Stockton it has not been seen up to November 28, this year.

This is the only *Melospiza* I have found in the pine forests.

73545	—	ad.	Soda Springs	Oct. 2, 1877
73622	—	ad.	Marysville?	
73623	—	ad.	.... do	
73624	—	ad.	.....do	
73940	—	ad.	Murphy's	Mar. 2, 1877

79. Peucæa ruficeps, (Cass.).—*Rufous-headed Sparrow.*

Only a single specimen of this species has been recognized while making this collection. It was shot while drinking from a spring in a growth of our largest species of fern, on a "cedar-chaparral" hill.

73941	—	ad.	Murphy's	Dec. 13, 1877

80. Passerella iliaca, β. **townsendi**, (Aud.).—*Townsend's Sparrow.*

A few of these birds were found in the willow thickets at Marysville in the winter of 1877–78. Only one was seen at Stockton after March 6. This was in the edge of the tules, and was evidently migrating.

73942	—	ad.	Murphy's?	Spring, 1877
73923	—	ad.	Marysville	Mar. 2, 1878
74266	♀	ad.	Stockton	Apr. 8, 1878
73943	—	ad.	Marysville	Mar. 2, 1877

80*a*. Passerella iliaca, γ. **schistacea**, Baird.—*Slate-colored Sparrow.*

77081	—	ad.	Murphy's	Jan. 4, 1879

***80*b*. Passerella iliaca**, δ. **megarhyncha**, Baird.—*Thick-billed Sparrow.*

This bird is a very common summer resident at Big Trees, below which but few are seen in the breeding season. I found it abundant at Soda Springs and Summit Meadows in the fall of 1877. This or the preceding species, perhaps both, is common at Murphy's in winter.

73939	♂	ad.	Big Trees	May —, 1877
73944	—	ad.	.....do	Spring, 1877
73945	—	ad.	.....do	Spring, 1877

***81. Hedymeles melanocephalus**, (Swains.).—*Black-headed Grosbeak.*

This bird is a common summer resident of all parts of this region. It arrived at Murphy's about May 1, 1877, and was first seen at Stockton May 6, 1878.

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A few were still at Big Trees August 27, but it was not seen in the ten succeeding days at Murphy's, nor did I find it at Stockton September 7 and later.

It was abundant in the willows by the San Joaquin River in May. On the 21st of the latter month I found a nest containing two young and an egg, and on June 3 full-fledged young were seen.

73954	♂ ad.	*Big Trees	May 10, 1877
73955	♂ ad.	....do	May 10, 1877

***82. Guiraca cærulea**, (Linn.).—*Blue Grosbeak.*

The males of this species arrived at Stockton May 6, 1878, the first females being seen on the 13th of that month. It was very common in the willows by the San Joaquin River, and was unexpectedly tame. A nest found there May 18 was in the forks of a willow, fourteen or fifteen feet from the ground. It left Stockton before September 7.

74450	♂ ad.	*Stockton	May 9, 1878
74451	♂ juv.	....do	May 23, 1878
74452	♀ ad.	....do	May 23, 1878
76588	♂ ad.	....do	May 9, 1878
76589	♀ ad.	....do	May 14, 1878

***83. Cyanospiza amœna**, (Say).—*Lazuli Bunting.*

The "Blue Linnet" was rarely seen at Stockton in May and June, 1878, though it is sometimes a common summer resident of this place. It was first seen here May 8, 1878, and departed before September 7. I have found it common at Murphy's in June; it left there previous to August 28.

76591	♂ ad.	*Stockton	June 3, 1878

***84. Pipilo maculatus, δ. megalonyx**, Baird.—*Long-clawed Towhee.*

This is a common constant resident of the valleys and foot-hills as high as Murphy's, and is a common summer resident of the pine forest up to the summit of the Sierras.

73962	♂ ad.	*Marysville	Feb. —, 1878
76590	— juv.	....do	June —, 1878

***85. Pipilo chlorurus**, (Towns.).—*Green-tailed Towhee.*

This bird is a common summer resident at Big Trees, Soda Springs, and Summit Meadows. It does not breed much below Big Trees. A few were seen at Murphy's April 17, 1878, after a slight fall of snow. I have seen but one in the valleys; this was at Marysville on February 12, 1878. It was in a burr-patch near the Yuba River, which was at this time flooding the thickets on its banks, and had perhaps driven the bird from its winter home.

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One specimen was seen at Murphy's on the 12th of February: this, also, was in a burr-patch, in the corner of a hog-corral.

73963	— ad.	*Big Trees	May 19, 1877

***86. Pipilo fuscus, β. crissalis,** (Vig.).—*Brown Towhee.*

This is a common or abundant constant resident of the foot-hills, and is found in the valleys in suitable localities. It does not breed much above Murphy's.

73956	— ad.	*Marysville	Mar. 2, 1878
73957	— ad.	do	Mar. 2, 1878
73958	— ad.	do	Mar. 4, 1878
73959	♂ ad.	do	Mar. 4, 1878
73960	♂ ad.	do	Mar. 2, 1878
73961	♂ ad.	do	Mar. 1, 1878
74275	♂ ad.	North American*	Mar. 12, 1878

Family ICTERIDÆ: The AMERICAN STARLINGS.

***87. Xanthocephalus icterocephalus,** (Bonap.).—*Yellow-headed Blackbird.*

This is an abundant summer resident of the tule marshes of the valleys: a few may remain in winter, but I do not remember seeing any at that time.

It arrived at Stockton April 6, 1878, and was rather rare until May. But few have been seen since October 15, those mostly young of the year, mixed with Red-wings (*Agelæi*). The only one seen after the first of November of this year (1878) was on the 19th instant, when a young bird was noticed in a flock of Red-wings.

Late in the summer and fall it daily visits the grain-fields east of Stockton, returning at evening to the tules.

74276	♂ ad.	*Stockton	Apr. 17, 1878

88. Agelæus phœniceus, (Linn.).—*Red-and-buff-shouldered Blackbird.*†

This form of the Red-wing was very abundant at Stockton in the spring of 1878 up to about May 10, when it disappeared during summer-like weather that followed. I have not seen any of the Red-wings in the mountains.

73835	♀ ad.	Marysville	Feb. 14, 1878
73836	♀ ad.	do	Feb. 14, 1878
73837	♀ ad.	do	Feb. 14, 1878
76594	♂ ad.	Stockton	Apr. 4, 1878

***88*a*. Agelæus phœniceus, β. gubernator,** (Wagl.).—*Red-and-black-shouldered Blackbird.*

This is an abundant constant resident of Stockton. The unmistakable adults mated early, while the immature of this species and *A. phœ-*

* Thirty miles east of Stockton.

† The specimens sent by Mr. Belding are perfectly typical of the species, and not distinguishable from examples from more eastern portions of the country.—R. R.

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niceus kept in flocks. Young birds able to fly were observed May 20, 1878.

73830	♂ ad.	Marysville	Feb. 14, 1878
73831	♂ ad.	....do	Feb. 14, 1878
73832	♂ ad.	....do	Feb. 14, 1878
73833	♂ ad.	....do	Feb. 14, 1878
73834	♂ ad.	....do	Feb. 14, 1878
74277	♀ ad.	*Stockton	Mar. 29, 1878
74278	♀ ad.	....do	Apr. 17, 1878
76592	♂ ad.	....do	Apr. 4, 1878
76593	♂ ad.	....do	Spring, 1878

89. Agelæus tricolor, (Nutt.).—*Red-and-white-shouldered Blackbird.*

The *A. tricolor* appeared to avoid Stockton in the spring of 1878. I recognized but four during the spring and summer. Two of these were seen March 22 and two on April 5.

73987	♂ ad.	Stockton	Spring, 1875

***90. Sturnella neglecta**, Aud.—*Western Meadow Lark.*

This bird is an abundant constant resident of the valleys and foot-hills as high as Murphy's. It is also a summer resident of some of the more suitable localities of the Upper Sierras.

73989	♂ ad.	*Murphy's	Spring, 1877

***91. Scolecophagus cyanocephalus**, (Wagl.).—*Brewer's Blackbird.*

This is an abundant constant resident at Stockton, probably equalling, possibly exceeding, in numbers the Red-wings, especially in autumn. It is also a constant resident at Murphy's, and in summer is found in suitable localities in the pine forests. It was very common at Summit Meadows in September, 1877. At Stockton many breed in closely-trimmed ornamental evergreens.

73988	♂ ad.	*Murphy's	Spring, 1877
76595	♂ ad.	Stockton	Sept. 30, 1878
76596	♀ ad.	....do	Sept. 30, 1878

***92. Icterus bullocki**, (Swains.).—*Bullock's Oriole.*

This Oriole is a common summer resident of the valleys and foot-hills. An adult male was shot at Big Trees July 13, 1878. This is the only one I have seen in the pine forests.

The males arrived at Murphy's March 24, 1877; at Stockton April 1, 1878. On April 6, 1878, the first female was seen. The species left Murphy's previous to August 27 and Stockton previous to September 7.

A nest found May 11 in a willow, eight feet from the ground, contained two eggs.

73986	♂ ad.	*Murphy's	Mar. 24, 1877
74453	♂ ad.	*Stockton	Apr. 1, 1878

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Family CORVIDÆ: The RAVENS, CROWS, and JAYS.

***93. Corvus americanus,** (Aud.).—*Common Crow.*

[Mr. Belding states that this species (which, however, he mistakes for *C. caurinus*) is "an abundant resident of Central California." The specimen he sends is true *americanus*, and not *C. caurinus*. The Crows which the writer observed in the Sacramento Valley, in June, 1867, were certainly *C. americanus*, their notes and habits in no wise differing from those of the Eastern birds of this species. It is probable that *C. caurinus* is, like the Eastern *C. ossifragus*, a strictly littoral species, never found away from tide-water.—R. R.]

76597	— ad.	Stockton.....	Nov. —, 1878

***94. Picicorvus columbianus,** (Wils.).—*Clarke's Nutcracker.*

This species is very common at Soda Springs and Summit Meadows in the fall, and is said to be a rare winter visitor to the Big Trees.

***95. Pica nuttalli,** Aud.—*Yellow-billed Magpie.*

This Magpie is a common constant resident of Marysville, and, during some years, at Stockton also, but I did not see it at the latter place from April 1, 1878, to October 18 of the same year, though it was seen in June at many places on the route between Stockton and Marysville. On December 22, 1877, I saw it at Salt Spring Valley, between Milton and Murphy's (altitude about 1,200 feet). It probably occasionally breeds at Murphy's.*

73818	♂ ad.	Marysville.....	Feb. —, 1878

***96. Cyanocitta stelleri, β. frontalis,** Ridgw.—*Californian Mountain Jay.*

This Jay is very common in the pine forests in summer, and is a winter sojourner of the chaparral belt, especially that part nearest the pine forest. A few breed down to an altitude of 3,000 feet or a little less. It is an occasional winter visitant to the live-oak groves in the Sacramento Valley, ten or twelve miles north of Marysville.

73890	— ad.	Murphy's.....	Apr. 12, 1877

***97. Aphelocoma californica,** (Vig.).—*Californian Valley Jay.*

This is a common constant resident of the valleys and foot-hills, and appears to be quite numerous in the pine forests in summer, as high as Big Trees, where I found it in July and August, 1878; also at Gardiner's Meadow, three miles east of Big Trees, the altitude the same as that of Big Trees; and at Dunbar's and Moran's Meadows (altitude 3,800 feet). In the pine forests above Murphy's it was confined to the thickets in

* I lived at Murphy's from the spring of 1857 to 1860, but in summer only. Think I have seen it there formerly, but not recently.

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and around meadows. It is more abundant in the valleys in winter than in summer.

Once, having shot a Quail which fluttered violently, one of these birds pounced upon it and began to tear it.

73829	— ad.	*Marysville	Feb. —, 1878
76598	— juv.	Big Trees	July —, 1878

98. Perisoreus canadensis (γ. **obscurus**, Ridgw. ?).*—*Oregon Gray Jay.*

On October 7, I saw at Summit Meadows what I supposed to be this bird. It is said to breed in the high parks of Castle Peak, a few miles north of the Summit Meadows.

Family ALAUDIDÆ: The TRUE LARKS.

99. Eremophila alpestris, (Forst.).—*Horned Lark.*

The Horned Lark was common at Marysville in the winter of 1877–78, in flocks of not more than twenty-five or thirty, generally less. A small flock was seen at Summit Meadows in the fall of 1877.

73788	♂ ad.	Marysville	Feb. —, 1878
73789	♂ ad.	do	Feb. —, 1878
73970	— ad.	Summit Meadows	Oct. 6, 1877

99 *a*. Eremophila alpestris, β. **chrysolæma**, (Wagl.).—*Southern Horned Lark.*

This form of the Horned Lark is an abundant resident at Marysville, in summer frequenting the dry plains, especially those near the low, rolling hills on the eastern margin of the valley, where the growth of vegetation is meagre. In December, 1878, it was abundant on the low, rolling hills east of Stockton, on the road to Copperopolis.

The difference in appearance between a flock of these while on a field of short, green grass in bright sunshine, and that of a flock of the northern variety is so great that any collector could not fail to observe it.†

73787	♂ ad.	*Marysville	Feb. —, 1878
73964	— ad.	*Calaveras County (at Milton)	Spring, 1877
73965	— ad.	do	Spring, 1877
73966	♂ ad.	Marysville	Feb. —, 1878
73967	♂ ad.	do	Feb. —, 1878
73968	♂ ad.	do	Feb. —, 1878
73969	♂ ad.	do	Feb. —, 1878
76599	♂ ad.	do	Feb. —, 1878
76600	♀ ad.	do	Feb. —, 1878

*It is somewhat uncertain whether the birds alluded to above are of the Oregon form (*obscurus*) or the Rocky Mountain race (β. *capitalis*, Baird). Judging from analogy, however, in the cases of *Cyanocitta* and *Aphelocoma*, they should be the former, a probability strengthened by the fact that Mr. Henshaw obtained specimens of *obscurus* at Camp Bidwell, in the northern Sierra Nevada.—R. R.

†The fine series of this very strongly marked race, sent by Mr. Belding, shows unusual uniformity of characters for birds of this genus, there being little variation among individuals. The light pinkish gray tints of the more northern and eastern forms (*alpestris* and *leucolæma*) are replaced by a very deep cinnamon color, or rusty brown, while the size is decidedly smaller. They agree quite closely with Mexican examples, as described in *History of North American Birds* (vol. ii, p. 144).—R. R.

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Family TYRANNIDÆ: The TYRANT FLYCATCHERS.

***100. Tyrannus verticalis**, (Say).—*Western Kingbird.*

This bird arrived at Murphy's April 12, 1877, and at Stockton March 20, 1878. It is an abundant summer resident at Stockton, Murphy's, and Marysville. Two were seen at Big Trees in May, 1877, and one at the same place August 10, 1878. It was very rare at Murphy's August 27, 1878, and had left there before September 7.

73991	— ad.	*Murphy's	Apr. 12, 1877

***101. Myiarchus cinerascens**, Lawr.—*Ash-throated Flycatcher.*

The Ash-throated Flycatcher was first seen at Murphy's April 17, 1877; at Stockton April 27, 1878, where it was abundant in the thickets by the San Joaquin River during the first half of May. A few were seen there afterward, and these may have had nests, although I have generally found them during the breeding season *in oak groves.*

It is quite a common summer resident at Stockton and Murphy's, and a young one was shot at Big Trees August 10, 1878. It was very rare at Murphy's August 27, 1878. It was not seen at Stockton on or after September 7.

73546	♂ ad.	*Murphy's	Apr. 17, 1877
73992	— ad.	.....do	Apr. 17, 1877
74281	♂ ad.	*Stockton	Apr. 27, 1878

***102. Sayornis nigricans**, (Swains.).—*Black Pewee.*

This bird is a common constant resident of Stockton, Murphy's, and Marysville. It frequented the willows by the streams in the meadows at and near Big Trees in July and August, 1878. Since it was oftener seen in August than in July, it may have made a short vertical migration from lower down after the breeding season.

73611	— juv.	*Stockton	*July —, 1877
74000	— ad.	*Murphy's	Winter, 1877
74279	♂ ad.	Stockton	Apr. 9, 1878
74280	♂ ad.	.....do	Apr. 1, 1878

103. Sayornis sayus, Bonap.—*Say's Pewee.*

This Pewee is a winter sojourner at Stockton, Murphy's, and Marysville, where, however, it is rarely, if ever, common. It was first noticed at Stockton in the fall of 1878, on October 17.

73999	— ad.	Stockton	Nov. —, 1877
76601	— ad.	.....do	Oct. 17, 1878

***104. Contopus borealis**, (Swains.).—*Olive-sided Flycatcher.*

This is a very common and generally distributed summer resident at Big Trees. I shot one July 7, 1878, which had materials for a nest in

* Albinescent

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its bill. About a week later I found a young bird which could scarcely fly, and which, on being caught, proved very pugnacious. Its song is a loud prolonged "*three deer*," the last syllable being much shorter than the first. Both are occasionally prefaced with a short note in a lower key. Its other very common, not unmusical notes, I once copied with the syllables "*chu-chu-chu*"; again, "*pu-pu-pu*"; again, "*pip-pip*", the notes apparently varying with the individual. These notes follow each other rapidly, sometimes consisting of groups of two, usually of three, occasionally of four, a call almost invariably ending with groups of the same number as that with which it began. It is usually uttered from the top of a dead tree, often two hundred feet from the ground. It appears to prefer the tops of the tallest dead trees as a foraging centre. They utter notes while chasing one another, which I once described as resembling those of Flickers, but I am not now satisfied with that description.

73993	— ad.	*Big Trees	May 25, 1877
75316	♀ ad.	do	July 7, 1878
75317	♂ ad.	do	July 16, 1878

***105. Contopus richardsoni**, (Swains.).—*Western Wood Pewee.*

This species was first noticed at Stockton during the spring of 1878, on May 9, soon after which it became common in all suitable localities. It is common in the pine forests in summer. It was rare at Murphy's August 27, and was not seen at Stockton in September or later.

73547	.....	*Murphy's	—— —, 1877
73994	.....	*Big Trees	May 25, 1877
73995	.....	do	Spring. 1877
74454	.....	*Stockton	May 15, 1878
76602	.....	Murphy's	Sept. —, 1878

***106. Empidonax difficilis**, Baird.*—*Western Yellow-bellied Flycatcher.*

Only two of these birds were recognized at Stockton in the spring of 1878, the first being noticed on May 1. Two or three were seen at Big Trees in July and August. These were in willows at the head of ravines, near springs. Those seen at Stockton were in opent oak groves.

75318	♂ ad.	Big Trees	July 27, 1878

***107. Empidonax pusillus**, (Swains.).—*Little Flycatcher.*

This is a common summer resident at Stockton and Marysville. It seems invariably confined to willow thickets, and to occur wherever they do, whether in valleys or mountains.

*In my report on the Ornithology of the U. S. Geological Exploration of the 40th Parallel (Clarence King), p. 544, I considered this bird as specifically distinct from *E. flaviventris*, chiefly on account of supposed great differences in the location and character of the nest and eggs. Facts subsequently brought to light, however, by Messrs. H. A. Purdie and S. D. Osborne (see *Bull. Nutt. Orn. Club*, Oct. 1878, pp. 166, 187), show that the two do not differ in these particulars. Notwithstanding this, the difference between the two forms in coloration and proportions is so marked that there should never be any difficulty in easily distinguishing them.—R. R.

†That is, not darkly shaded, the trees scattering, and with no undergrowth.

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It was first noticed at Stockton April 30, 1878, and was not seen here in September or October.

73044	♂	ad.	*Stockton	July —, 1877
73996	—	ad.	do	July —, 1877
74455	♂	ad.	do	May 11, 1878
75321	—	ad.	*Big Trees	Aug. 3, 1878

***108. Empidonax obscurus**, (Swains.).—*Wright's Flycatcher.*

This bird was first seen at Murphy's on April 28, 1877, at which time it was rather common. It perched on the lower dead limbs of small trees which grew on hillsides, from which it would make short flights over the valley below, and return to the same perch. I have not recognized it in the valleys.

75319	♂	ad.	*Big Trees	July 8, 1878
73047	♂	ad.	Murphy's	Apr. 28, 1877
73997	—	ad.	do	.....
75320	—	juv.	Big Trees	July —, 1878

***109. Empidonax hammondi**, Xantus.—*Hammond's Flycatcher.*

This small Flycatcher is a common summer resident of the pine forests, out of which I have not seen it except when migrating. It arrived at Murphy's April 25, 1877, and at Stockton May 9, 1878.

At the latter place it was rare, and confined to the willow thickets on the river-banks.

73045	♂	ad.	Murphy's	Apr. —, 1877
73046	♂	ad.	do	Apr. 28, 1877
73998	—	ad.	Soda Springs	Sept. —, 1877
76603	♂	ad.	Stockton	May 9, 1878

Family TROCHILIDÆ: The HUMMING-BIRDS.

***110. Stellula calliope**, Gould.—*Calliope Humming-bird.*

While making this collection I have seen but two of these birds in spring plumage: these were at Murphy's, in April. It was very rare at Big Trees in July and August. I have never seen it in the valleys.

At Soda Springs, in the fall of 1877, Humming-birds were abundant. I shot a number of them. They were young or moulting, and so did not preserve them. They were principally *Selasphorus rufus*, but perhaps the present species was among them.

74005	♂	ad.	Murphy's	Apr. —, 1877
75325	♀	ad.	Big Trees	Aug. 1, 1878

***111. Trochilus alexandri**, Bourc. & Muls.—*Black-chinned Humming-bird.*

This bird was common in the open parts of the willow thickets at Marysville in June, 1878. It was not observed at Stockton from March 6 to June 8, though not more than five Humming-birds were seen during that time, and five or six are all I have seen at Stockton during the pres-

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ent season. I do not know whether this is usually the case or not, as this was my first spring and summer collecting here. Nearly every one seems to know the Anna Humming-bird, but I did not see it here last spring.

T. alexandri must have been rare at Big Trees, as I did not see an adult male in spring plumage, and was not certain of the species to which the one which I shot there belonged.

74462	♂ ad.	*Marysville	June 21, 1878
74463	— juv.	do	June 22, 1878
75323	♂ juv.	Moran's Meadow	July 24, 1878
75324	— juv.	Big Trees	July —, 1878

***112. Calypte annæ**, (Less.).—*Anna Humming-bird.*

This Hummer is abundant at Murphy's and in the hills below during a large portion of the year. It was seen at Copperopolis* on the 12th of December of the present year. There were no wild flowers, excepting those of the "Manzanita." Specimens shot there were very fat, and had been feeding on a sweet gummy substance exuding from perforations made by Woodpeckers in the bark of an evergreen oak.

74001	♂ ad.	*Murphy's	Jan. 30, 1877
74002	♂ ad.	do	Spring, 1877
74003	♂ ad.	do	Spring, 1877
74004	♀ ad.	do	Spring, 1877
75322	♀ ad.	Big Trees	Aug. 1, 1878

***113. Selasphorus rufus**, (Gmel.).—*Rufous-backed Humming-bird.*

This species is common at Big Trees in summer, and abundant at Soda Springs in the fall. I have seen a few at Stockton and Murphy's in spring.

74267	♀ ad.	Stockton	Apr. 30, 1878
75326	— juv.	Big Trees	July 25, 1878

Family CAPRIMULGIDÆ: The GOATSUCKERS.

114. "Antrostomus" nuttalli, (Aud.).—*Poor-will.*

The specimen in the collection is the only one I have seen in two years.

73978	— ad.	Stockton	July —, 1877

***115. Chordeiles popetue** (Vieill.) (*β.* **henryi**, Cass. ?).—*Night Hawk.*

The Night Hawk is abundant at Soda Springs in July and August and during the first part of September.

I suppose a few occur at Big Trees in July or August, as (in 1878) I heard of "Whippoorwills" there which roosted on trees, but I could not find any.

* Copperopolis is in the pine belt, about 1,200 feet above sea-level.

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Family PICIDÆ: The WOODPECKERS.

***116. Picus villosus, *c.* harrisi,** Aud.—*Harris's Woodpecker.*

This is a common summer resident of Big Trees. It is also numerous at Soda Springs and Summit Meadows in the fall. I have seen it at Murphy's in winter, but not in summer. It breeds but little below Big Trees. I have not seen it in summer below an altitude of 3,500 feet, nor have I ever seen it at Stockton or Marysville.

73856	♂	ad.	*1877
73857	♂	ad.	1877
73858	♀	ad.	1877
73859	♀	ad.	1877

117. Picus pubescens, Linn.—*Downy Woodpecker.*

A single individual of this species was shot at Marysville, as below recorded.

73606	♂	ad.	Marysville	Dec. 27, 1877

***117 *a*. Picus pubescens, *β*. gairdneri,** Aud.—*Gairdner's Woodpecker.*

This bird was abundant in the willows at Marysville in the winter of 1877–78, and was often seen at the same place the following June.

It appears to be generally distributed in the pine forest, but I have not found it abundant nor even scarcely common.

73607	♀	ad.	*Marysville	Dec. 27, 1877
73806	♂	ad.	do	Feb. —, 1878
73807	♂	ad.	do	Feb. —, 1878
73808	♀	ad.	do	Feb. —, 1878
73809	♀	ad.	do	Feb. —, 1878
73860	♂	ad.	Murphy's	Feb. —, 1877
73861	♂	ad.	do	Feb. —, 1877
74259	♀	ad.	Marysville	June 14, 1878
76360	—	juv.	*Big Trees	July 26, 1878

***118. Picus nuttalli,** Gamb.—*Nuttall's Woodpecker.*

This is a common constant resident at Stockton, Murphy's, and Marysville. I have not recognized it in the pine forests. One seen at Marysville in June was red from bill to nape. It was too near to shoot.† The iris of all I shot at Marysville was dark blood-red.

73033	♀	ad.	*Murphy's	Apr. —, 1877
73801	♂	ad.	*Marysville	Feb. —, 1878
73802	♂	ad.	do	Feb. —, 1878
73803	♂	ad.	do	Feb. —, 1878
73804	♀	ad.	do	Feb. —, 1878
73805	♀	ad.	do	Feb. —, 1878
73855	♂	ad.	Murphy's	Apr. 20, 1877
76605	♂	ad.	Stockton	Nov. 13, 1878

***119. Picus albolarvatus,** (Cass.).—*White-headed Woodpecker.*

I have found this bird abundant at Big Trees in summer, and common at Soda Springs and Summit Meadows in fall. In December, 1877,

* Mr. Belding writes in regard to these specimens that one was from Big Trees, one from Murphy's, and two from Summit Meadows.—R. R.

† Probably a young male.—R. R.

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one was seen near Murphy's at an elevation of about 3,000 feet, the lowest point at which I have observed it.

It breeds in low stumps, fallen and standing trees, rarely more than fifteen feet from the ground, often but three or four. When chasing one another around the trunks or through the branches of trees, their cry is "wick-wick-wick-wick-wick-wick," syllable rapidly following syllable. However, they do not often indulge in play.

75854	♂ ad.	*Big Trees.....	May —, 1877

120. Picoides arcticus, (Swains.).—*Black-backed Three-toed Woodpecker.*

In the fall of 1877 I shot one of these birds at Soda Springs and one at Summit Meadows. It was very rare at both places. I have not seen it at Big Trees, nor below that altitude.

73862	♀ ad.	Soda Springs.....	Sept. —, 1877
76706	♀ ad.	Summit Meadows.....	Sept. —, 1877

***121. Sphyropicus varius**, *β.* **ruber**, (Gmel.).—*Red-breasted Woodpecker.*

Next to *P. albolarvatus*, this is the most common Woodpecker at Big Trees in summer. I also found it common at Soda Springs in fall, and shot two young birds, which were probably hatched there. It is a rather rare winter sojourner at Marysville and Murphy's.

73851	— ad.	Murphy's.....	Winter and spring, 1877
73852	— ad.	.....do	
73853	— ad.	.....do	
76607	— juv.	Big Trees.....	July —, 1878

122. Sphyropicus thyroideus, (Cass.).—*Black-breasted Woodpecker.*

I saw five or six of these birds at Soda Springs in the fall of 1877, and in December of the same year shot one at Murphy's (altitude about 2,400 feet). These are all I have recognized.

73849	♀ ad.	Murphy's.....	Dec. —, 1877
73850	♀ ad.	Soda Springs.....	Sept. —, 1877
73548	♂ ad.	.....do	Sept. —, 1877
73549	♀	.....do	Sept. —, 1877

***123. Hylotomus pileatus**, (Linn.).—*Pileated Woodpecker.*

This bird is often seen at Big Trees in summer, and some years ago I observed that it was quite common in the Coast Range of mountains on the North Fork of Eel River in Mendocino County. It does not appear to be abundant in any part of Central California.

73848	♀ ad.	*Big Trees.....	Spring, 1877
76359	♂ ad.	.....do	July 28, 1878

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***124. Melanerpes torquatus**, (Wils.).—*Lewis's Woodpecker.*

This is a common resident of Stockton and Marysville, and appears to be more numerous in the valleys than in the foot-hills or the Upper Sierras, where, however, it occasionally occurs.

Those I have seen in the pine forests were apparently traveling in straggling scattered flocks. I have not found it at Big Trees in breeding season.

73823	— ad.	*Marysville	Feb. —, 1878
73824	— ad.	do	Feb. —, 1878
74282	♂ ad.	*Stockton	Mar. 27, 1878
74283	♀ ad.	do	Apr. 9, 1878

***125. Melanerpes formicivorus**, (Swains.).—*Californian Woodpecker.*

This is an abundant constant resident of the valleys and foot-hills. I shot one at Big Trees in August, but considered it a straggler.

73825	♂ ad.	*Marysville	*Feb. —, 1875
73826	♂ ad.	do	Feb. —, 1878
73827	♀ ad.	do	Feb. —, 1878
73828	♀ ad.	do	Feb. —, 1878
73865	♀ ad.	*Murphy's	Spring, 1877
76708	♂ ad.	Marysville	Winter, 1878

***126. Colaptes auratus**, *β.* **mexicanus**, Swains.—*Red-shafted Flicker.*

This is a common constant resident at Stockton, Murphy's, and Marysville, and is a common summer resident of the pine forests.

73601	♂ ad.	*Marysville	Dec. 29, 1877
73605	♂ ad.	do	Dec. 29, 1877
73810	— ad.	do	Winter, '77–78
73820	♂ ad.	do	Feb. —, 1878
73821	♂ ad.	do	Feb. —, 1878
73822	♂ ad.	do	Feb. —, 1878
76609	♀ ad.	Stockton	Oct., 3, 1878
76610	♀ juv.	Marysville	June —, 1878

***126** *a.* **Colaptes auratus**, *γ.* **hybridus**, Baird.—*"Hybrid" Flicker.*

The plumage of probably half the numerous Flickers which I shot in January and February, 1878, at Marysville was variously intermediate between that typical of the supposed species *C. mexicanus* and *C. auratus*. Those with uniformly golden shafts were unquestionably the rarest of all. Quite a large number of those I had the good fortune to shoot in January had well-developed red nuchal crescents, and the iris was usually dark blood-red.† No trace of black in the cheek-patches was observed in any of them. At Stockton, in March, 1878, I found it somewhat difficult to find a specimen in which the shafts were all yellow, or in which this color even predominated, though the number of specimens taken here at different times satisfied me that "hybrids" were not

* "Iris milky white, tinged with pale pink or carmine; feet pale pea-green."—Note to one of the above specimens.—R. R.

† This is frequently the color of the iris in very adult specimens of both *mexicanus* and *auratus*, and is, perhaps, a mark of high maturity, possibly a mere individual peculiarity.—R. R.

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uncommon residents. It occurred to me while in Marysville, in June, that by shooting more young from a family, some light might be thrown on the subject,* but in no case did I succeed in getting more than one.

[This series is one of great interest, as showing that the so-called "Hybrid Flicker" is by no means confined to the region where the ranges of the true *auratus* and *mexicanus* join or blend. Dr. Cooper records (Orn. Cal. i, p. 412, note) "two or more specimens" from near Oakland, Cal.; and the writer observed, on several occasions, in the extreme western portion of Nevada, Flickers having pure yellow shafts, and so much resembling, at the distance from which they were observed, the *C. auratus* or *C. chrysoides*, that they were doubtfully referred to one or the other of these species (see Orn. 40th Parallel, p. 557). This probable error was based upon geographical considerations, the chances against their being the *C. hybridus* being the assumed scarcity of this species west of the Missouri region, taken together with the known tendency of strictly Eastern species to straggle westward, even to the very frontiers of California (*e. g.*, *Tyrannus carolinensis* and *Ectopistes migratoria* in western Nevada), and the possible northward extension of the range of *C. chrysoides* to the district indicated.

None of the specimens collected by Mr. Belding have black moustaches, and he says that he has seen none thus marked. He considers the occurrence of the scarlet occipital crescent quite frequent, however, as is also the admixture of yellow feathers in the wings and tail, or the entire replacement of the red of the one species and the pure yellow of the other by a tint more or less intermediate between the two. One specimen corresponds very nearly to *C. "ayresi"* of Audubon, having red moustaches, gray throat, and yellow shafts; the latter have a decided orange cast, however, while there is merely a trace of the occipital crescent. The most interesting specimen of all is one of which, unfortunately, only the wings and tail were sent. In this, the remiges and rectrices are deep red as in typical *mexicanus*, with the exception of the middle pair of the latter and one secondary (the corresponding one) of each wing, which are pure gamboge-yellow, without a trace of orange, the contrast being thus very striking. Another specimen, of which only the tail was sent, is similar, except that the middle tail-feathers are pale pinkish instead of yellow.

It may be remarked, as a noteworthy fact, that in all the specimens sent by Mr. Belding, the pattern of coloration is perfectly symmetrical, so far as opposite sides of the bird are concerned; that is, when there are one or more feathers of "abnormal" color in one wing or in one-half of the tail, these are represented by corresponding ones on the opposite side. How far this rule will hold good when other specimens are examined I do not know, but my opinion, based upon my recollection of

* The securing of the *entire family*—that is, both the parents and their young—whenever the occasion offers, is a much needed aid to the determination of the real character of these so-called "hybrid" Flickers.—R. R.

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many other specimens, is that it will be found of nearly universal application.*—R. R.]

73602	♂ ad.	Marysville	Dec. 29, ——	
73603	— ad.	....do	Dec. 29, ——	Tail only.
73604	— ad.	....do	Dec. 29, ——	Do.
73811	— ad.	....do		
73819	♂ ad.	....do	Feb. —, 1878	
73863	♀ ad.	....do	Mar. 1, 1877	
73864	♀ ad.	....do	Mar. 1, 1877	
74458	♀ ad.	*Stockton	June 8, 1878	
76611	♂ ad.	——?	May 18, 1878	Wings and tail.

Family ALCEDINIDÆ: The KINGFISHERS.

***127. Ceryle alcyon**, (Linn.).—*Belted Kingfisher.*

The Kingfisher is a common resident at Stockton. It is also occasionally seen at Murphy's, at all seasons. It is rarely found in the mountains of this region.

74284	♀ ad.	*Stockton	Apr. 15, 1878

Family CUCULIDÆ: The CUCKOOS.

***128. Geococcyx californianus**, (Less.).—*Road Runner; Chaparral Cock.*

The Road Runner is a rare resident of the chaparral only. Many years ago I saw one between Vallecita and Angel's (altitude about 2,000 feet), and I have seen a few others in Calaveras County, below this elevation, three in Marysville buttes, one in the hills east of Marysville—in all about a dozen—in twenty or more years, though I have hunted a great deal in the foot-hills—lived at Murphy's and San Andreas from the spring of 1857 to October 1862.

***129. Coccyzus americanus**, (Linn.).—*Yellow-billed Cuckoo.*

The Yellow-billed Cuckoo was common in the willow and poplar thickets at Marysville in June, 1878, but whether generally distributed in the extensive thickets of like character so abundant along the rivers of Northern California, I am unable to say. I heard one at Murphy's about September 1, 1878.

74457	♀ ad.	*Marysville	June 22, 1878
76604	♂ ad.	....do	June 13, 1878

*Mr. Henshaw informs me that he examined a specimen taken at San Francisco, which had all the rectrices of one side of the tail red, those of the other half being yellow!—R. R.

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Family STRIGIDÆ: The Owls.*

***130. Strix flammea, β. pratincola,** Bonap.—*American Barn Owl.*

The Barn Owl is a common resident of the valleys, especially in the willow thickets near Stockton. I have not seen it in the mountains.

76612	— ad.	*Stockton	Wing only.
76613	— ad.	....do	Do.

131. Asio accipitrinus, (Pall.).—*Short-eared Owl.*

This Owl is common at Stockton and Marysville in winter. It left the former place about the first of April of the present year, and reappeared on or before September 30 following.

74298	— ad.	Summit Meadow	Sept. 16, 1877
74299	♂ ad.	Stockton	Mar. 30, 1878

132. Asio wilsonianus, (Less.).—*Long-eared Owl.*

I have seen this Owl at Marysville in former years, but do not think I have seen it anywhere within the last two years.†

***133. Bubo virginianus, δ. subarcticus,** Hoy.—*Western Great Horned Owl.*

This Owl is very common at Big Trees in summer and is occasionally seen in the valleys in winter. I do not remember seeing it in the valley during summer, nor did I see or hear it at Soda Springs or Summit Meadows in the fall of 1877, though I was informed that it is sometimes found there. There is one mounted at the Big Trees, which I shot there several years ago. It is often seen at Marysville, especially in winter.

***134. Scops asio,** (L.).—*Little Mottled Owl; Screech Owl.*

This Owl is quite abundant at Stockton. I have seen it among the foot-hills, but not in the pine forests. [These specimens, like all others from California and the Western Province in general, so far as known, are in the gray plumage.—R. R.]

76614	♀ ad.	Stockton	Nov. 12, 1878
76615	♂ ad.	....do	Nov. 13, 1878
76616	— ad.	....do	‡Oct. —, 1878

*I have never shot a bird of the genus *Syrnium* in California, though on October 25, 1878, I saw in an oak grove two large ash-colored Owls, which may have belonged to a species of this genus. They were nearly as large as the Great Horned Owl, and appeared to see well in the bright sunlight. No ear-tufts were noticed. At Big Trees I tried several nights to shoot a large Owl, which may have been a *Syrnium*, but did not succeed. One evening it flew, at a sharp angle, to the top of a dead pine-tree, out of the reach of shot, where it sat silently for about half an hour. [NOTE.—In the absence of any other known species to which the above description will apply, and allowing for the circumstances under which the birds were seen, it is quite possible that they were the grayish variety of *Bubo virginianus*.—R. R.]

†While attached to the U. S. Geological Exploration of the 40th Parallel, I found this Owl very abundant in the willow thickets at Sacramento City, in June, 1867.—R. R.

‡Found dead.

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*135. **Speotyto cunicularia, γ. hypogæa,** (Bonap.).—*North American Burrowing Owl.*

This is an abundant resident species of the valleys, out of which I have never seen it.

76617	— ad.	Stockton	Nov. —, 1878

136. **Glaucidium gnoma,** (Wagl.).—*Californian Pigmy Owl.*

This Owl was oftener seen at Murphy's in winter than any other. There it was sometimes found during the day, on or near the ground, in low chaparral, but quite as often in lone leafless trees; once, at least, in bright sunshine. The specimen in the collection was seen to catch and eat a *Parus montanus.*

73845	— ad.	Soda Springs	Sept. 13, 1877

Family FALCONIDÆ: HAWKS, EAGLES, KITES, ETC.

137. **Falco communis, β. nævius,** Gmel.—*American Peregrine Falcon.*

The Duck Hawk is a somewhat rare winter sojourner in the valleys of Central California. I have not seen it in the mountains.

[The two specimens sent are in very dark plumage, being quite uniformly black above and very heavily marked beneath. They are quite identical, however, with Eastern specimens which I have seen, and are fully as large.—R. R.]

76618	♀ juv.	Stockton	*Oct. 27, 1878
76619	♀ juv.	do	Oct. 29, 1878

138. **Falco mexicanus, β. polyagrus,** Cass.—*Prairie Falcon.*

I saw a few specimens of this Falcon at Marysville in the winter of 1877–78. I think that I saw one at Stockton, November 19, 1878. The one in the collection is the only specimen seen at the Summit Meadows in the fall of 1877.

[The single specimen in the collection is in the very rare perfect adult plumage. This is *transversely barred* above with pale reddish umber and bluish gray, quite unlike any other American Falcon.—R. R.]

76620	♂ ad.	Summit Meadows	Sept. 16, 1877

139. **Æsalon columbarius,** (Linn.).—*American Merlin; Pigeon Hawk.*

The Pigeon Hawk is occasionally seen in the valleys and foot-hills in winter. I have never seen it in any part of this country in summer.

76621	♂ juv.	Stockton	Nov. 2, 1878
76622	♂ juv.	do	Oct. 27, 1878

* Weight 2½ pounds; feet pale greenish yellow.

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***140. Tinnunculus sparverius,** (Linn.).—*American Kestril.*

This is a very common constant resident of the valleys and foot-hills as high as Murphy's, and is a common summer resident of the pine forests.

74290	♂ juv.	*Soda Springs	Fall, 1877
74291	♂ ad.	*Murphy's	Spring, 1877
74292	♀ ad.	....do	Spring, 1877

141. Pandion haliaëtus, β. **carolinensis,** (Gm.).—*American Osprey; Fish Hawk.*

I do not remember seeing this bird in California. This may be owing to the fact that so many of the streams are muddied by the extensive mining operations in the mountains. I have known it well since a boy, consequently it could not have escaped my observation. I am told, however, that it inhabits the Upper San Joaquin Valley, and it is quite likely that it does the Upper Sacramento also.

***142. Elanus leucurus,** (Vieill.).—*White-tailed Kite.*

This is a common constant resident of Stockton, where I have seen as many as twenty at the same moment within a circle of half a mile. I have seen it at Marysville in winter. It is rarely out of the tule marshes.

The specimens I sent were stained by falling in muddy water or from catching mice in a large alfalfa field in the "reclaimed" tule ground. Some of them I tried to wash, but with indifferent success.

*73841	— ad.	*Stockton	Mar. —, 1878
73842	— ad.	....do	Nov. —, 1877
74293	♀ ad.	....do	Apr. 17, 1877
74294	♀ ad.	....do	Apr. 20, 1877
74295	♀ ad.	....do	Apr. 14, 1877

143. Circus hudsonius, (Linn.).—*Marsh Hawk.*

The Marsh Hawk is a very common resident of the valleys, but is most numerous in winter. The adult plumage of the male is quite common.

76630	♀ ad.	Stockton?	.....

144. Accipiter cooperi, (Bonap.).—*Cooper's Hawk.*

This Hawk seems to be rare in the interior of California, since I have seldom recognized it within the last two years. I was well acquainted with it in Pennsylvania nine or ten years ago. In the fall of 1877 I winged, at Soda Springs, what I think was a specimen of this bird, and in December, 1878, I shot one at Copperopolis.

145. Accipiter fuscus, (Gmel.).—*Sharp-shinned Hawk.*

This Hawk is common during summer in the upper Sierras, and is occasionally seen in the foot-hills and valleys in winter. I did not see it at Big Trees in July and August, nor do I remember having seen it at Marysville last winter.

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The one in the contribution of December, 1878, is all I have seen at Stockton since September 6. It was often seen at Soda Springs and Summit Meadows in fall.

73843	♂ juv.	Soda Springs	....
73844	♀ juv.	.....do	....
76623	♂ juv.	Stockton.....	Sept. 24, 1878
76624	♀ juv.	Murphy's.....	Spring, 1877

***146. Buteo borealis, β. calurus,** (Cass.).—*Western Red-tailed Hawk.*

This Hawk was oftener seen at Soda Springs in the fall of 1877 than any other species of the genus. Two of the four which were shot there were young birds, nearly grown. I have seen one specimen, which was shot at Marysville about November 1.

Red-tailed Hawks are very common constant residents of the valleys, and in summer are quite as common in the mountains.

74296	— juv.	Soda Springs.....	Sept. 15, 1877
76625	— juv.	Big Trees	July —, 1878
76626	♂ juv.	Stockton	Oct. 29, 1878
76627	♀ ad.	.....do	*Oct. 25, 1878

***147. Buteo lineatus, β. elegans,** (Cass.).—*Red-bellied Hawk.*

Buteo elegans is very common at Stockton in summer. It was quite abundant as late as October 1, 1878, but was rarely seen after the 15th, although individuals were observed November 10 and 16.† A nest seen June 8, in nearly horizontal limbs of an oak, was forty or fifty feet from the ground, irregular in shape, about eighteen inches thick, and, judging by the leaves attached to some of the twigs, was built of dead and living twigs and sticks. The cavity of the nest must have been shallow, as its occupant could be seen at a short distance from the base of the tree.

74297	♂ ad.	*Stockton.....	May 1, 1878

148. Archibuteo lagopus, β. sanctijohannis, (Gmel.).—*American Rough-legged Hawk.*

The Rough-legged Hawk is the only *Archibuteo* I have been able to shoot at Stockton this season, and I think this is the first I have seen since September 6. It had a larger companion. I saw two of these Hawks in a cage at Marysville last winter; both had been slightly winged. They were very tame. I have seen only three or four black-plumaged specimens in the past three years. One of these was at Big Trees last August, and one at Stockton April 1, 1878.

76628	— juv.	Stockton.....	‡Nov. 23, 1878

* Weight 3 pounds 5 ounces. Iris brownish-orange.

† In a letter dated December 28, Mr. Belding observes that it had been rare up to that date at Stockton.—R. R.

‡ Iris pale brownish yellow; web of mouth rich lemon-yellow.

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149. Archibuteo ferrugineus, (Licht.).—*California Squirrel Hawk.*

I saw a splendid specimen of this fine Hawk at Marysville last winter. It was shot about January 1.

***150. Aquila chrysaëtus, β. canadensis**, (Linn.).—*American Golden Eagle.*

This Eagle is rarely seen in Central California. I saw one near Stockton May 14, 1878, and two young ones that were caught in the mountains of Tuolumne County in 1877 by Indians; also one at Soda Springs in 1876. These are probably all I have seen in three years. Formerly it was more numerous in the valleys.

151. Haliaëtus leucocephalus, (Linn.).—*White-headed Eagle; Bald Eagle.*

The Bald Eagle was formerly common in the valleys, particularly in winter. It now rarely visits Stockton or Marysville, but is said to be common in the southern part of the San Joaquin Valley.

Family CATHARTIDÆ: The AMERICAN VULTURES.

***152. Rhinogryphus aura**, (Linn.).—*Turkey Buzzard.*

The Turkey Buzzard is a common resident of Central California, being found as high up in the mountains as Murphy's. It was seen nearly every day at the Big Trees in July and August.

76629	— ad.	Murphy's.....	Spring, 1877

153. Pseudogryphus californianus, (Shaw).—*California Condor.*

The California Condor appears to be very rare in this region. I have seen it on no more than two or three occasions in Yuba County in winter, and do not think I have seen it at any other place. They probably visit the vicinity of Marysville only in winter, and are never common.

Family COLUMBIDÆ: The PIGEONS or DOVES.

***154. Columba fasciata**, Say.—*Band-tailed Pigeon.*

I have seen but few of these birds in the Sierras in summer, though it probably breeds there, as I have occasionally shot young birds at Big Trees, apparently about a month old. They were at that age excellent food, which cannot be said of it at any other time, its flesh being very bitter from eating acorns in winter and oak-buds in spring.

It is sometimes common in the foot-hills in winter, but never abundant as compared with the abundance of the Passenger Pigeon of the Atlantic States.

76631	♂ ad.	Murphy's.....	Dec. —, 1877

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***155. Zenædura carolinensis,** (Linn.).—*Mourning Dove.*

The Mourning Dove is abundant in all parts of the valleys and foothills in summer, at which time it is rather common between Murphy's and Big Trees, though found principally in the open places of the forest.

It is rare at Stockton in winter, though quite common at Marysville during the same time. Flocks of fifty or a hundred may be found every winter at the latter place, although not nearly so abundant at that time as in summer.

At Murphy's, August 29, 1878, I found two nests, both of which contained eggs. Two days later I found young birds in one of them.

Family TETRAONIDÆ: The GROUSE.

***156. Canace obscura,** (Say).—*Dusky Grouse.*

This fine game bird is quite abundant near the summit of the Sierra Nevada, latitude 39°, and a few breed at Big Trees, where I once found a nest containing seven eggs, which is about as many as they ever lay, judging by the many flocks of young birds of less number which I have seen. They utter, from a tree, when alarmed, the same "*kuk, kuk,*" as nearly as I remember, a Prairie Chicken (*Cupidonia cupido*) does under similar circumstances. In August and September the males keep by themselves, and are generally found singly. Toward the last of September I have had much difficulty in finding this bird at places where it had previously been common. The explanation may be that they are then in the tall, dense evergreens, or have, as they are said to do, gone well up the adjacent peaks, or, possibly, lower down; but this last is not likely, as they do not appear to be more numerous at Big Trees or the lower portion of their range in winter than in summer. I have not seen it at or several hundred feet above Murphy's.

It is said to remain in particular trees much of the time in winter, and to be found by hunters by its droppings on the snow.

Family PERDICIDÆ: The PARTRIDGES and QUAILS.

***157. Oreortyx picta,** (Douglas).—*Californian Mountain Quail.*

This Quail is a common summer resident of the Sierra from an elevation of about 4,000 feet to 8,500 feet, and is generally distributed through the forest except where there is unusual scarcity of water or where the herbage is closely grazed by sheep. A few breed near Murphy's and between that place and Big Trees. Every winter it is common in the upper edge of the chaparral belt in Calaveras County, and it is usually common in November in Yuba County at an altitude of six hundred feet or less; while near Oroville and on the Honcut Creek, I have seen it nearly on a level with the Sacramento Valley.

When scattered, their call is much like that of young turkeys. In breeding season, the male has a loud, modulated, very agreeable note. They hatched at Big Trees about July 8, 1878. Their eggs are cream-

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colored, unspotted, and the usual number is about fifteen. This bird is easily shot when not quite grown, and appears to become confused when migrating, especially in fall, when they are inexperienced; but when grown, and have learned to fear the hunter, they are bagged with difficulty. When making their vertical migrations, the Indians catch many of them in compact brush fences about two feet high, running obliquely from a creek or cañon over a hill. Occasional holes are left in the fence in which snares of hair or twine are placed. Some of these fences are more than a fourth of a mile long. Many of the birds are taken alive from the snares and sold to the "whites." They soon become tame in cages, and could probably be domesticated with little trouble. The Indians claim to distinguish sex by the length of the plume, but I have reasons for doubting their ability to do so.

A nest found at Big Trees in July, 1878, contained 13 eggs, was built on the ground in a thick growth of "Rock Rose," an evergreen shrub about two feet high, without branches until near the top; leaf very minutely divided. I did not see the nest until the eggs were nearly hatched.

[Mr. Belding observes in one of his communications that these birds are very fond of the service-berry (fruit of the *Amelanchier canadensis*), and adds: "Mountain Quail are very plentiful, and easily shot, at Soda Springs, in September and October, and when travelling from one locality to another."—R. R.]

73979	♂ ad.	*Murphy's	Dec. —, 1877
73980	♂ ad.	do	Mar. —, 1877

***158. Lophortyx californica,** (Shaw).—*Californian Valley Quail.*

This is an abundant constant resident of the valleys and foot-hills. It is also common in summer in the pine forests as high as Big Trees, where, however, it is found only in and around the fields and meadows near human habitations, returning, at the approach of winter, to the chaparral belt.

In the mating season I have seen the males fight fiercely, much as turkeys do, the others of the flock appearing to take a great interest in the combat, in the mean time making a great outcry. In the first of the hunting season they are not very wild, and run a great deal, but when they have been shot at, scattered, persistently followed, and thoroughly frightened, they lie very close, especially if driven from their thickets to stubble-fields and ploughed ground. They do not increase much in the foot-hills after a dry winter. This Quail is attached to certain localities,—drinks, feeds, and hides in its own favorite places. The latest broods are hatched in the early part of September.

73981	♂ ad.	*Murphy's	Spring, 1877

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Family CHARADRIIDÆ: The PLOVERS.

159. Ægialitis montana, (Towns.).—*Mountain Plover.*

This species, known here as the "Bull-head Snipe," usually arrives at Stockton and Marysville in November, and I have seen a few in October. It frequents the dry plains, but is oftener found in fields that have been prepared for or sown with wheat than any other localities. It sometimes visits the low, rolling, gravelly hills to the east of the valley, and is often abundant, especially previous to the severe rains of winter. Some winters, however, I have not seen it at all in California. It was unusually abundant at Stockton in December, 1878.

76637	—juv.	Stockton	Nov. 3, 1878
76632	—juv.	.....do	Nov. 3, 1878

***160. Ægialitis vociferа**, (Linn.).—*Kill-deer Plover.*

The Kill-deer is a common resident of the valleys and foot-hills. I have not seen it higher up than Murphy's.

Family RECURVIROSTRIDÆ: The AVOCETS and STILTS.

161. Recurvirostra americana, Gm.—*American Avocet.*

The Avocet is very rare in the interior valleys. It is occasionally seen at Marysville in spring. I have not yet observed it at Stockton.

***162. Himantopus mexicanus**, (Müller).—*Black-necked Stilt.*

The Stilt is a common summer resident at Stockton. It was first seen here April 13, 1878, and had left by September 7. It breeds both here and in Sutter County.

76633	♀ ad.	*Stockton	Apr. 13, 1878

Family SCOLOPACIDÆ: The SNIPES, SANDPIPERS, etc.

163. Gallinago wilsoni, (Temm.).—*Wilson's Snipe.*

This bird is a common winter resident of Central California, being found in suitable localities in the foot-hills as high up as Murphy's. It sometimes remains as late as May 15, and was seen at Stockton as early this year as September 7.

A few are said to breed here, but this is very doubtful.

74287	— ad.	Stockton	Spring, 1878
76638	— ad.	.....do	Oct. —, 1878

164. Macrorhamphus griseus, (Gmel.).—*Red-breasted Snipe.*

This bird was first seen at Stockton April 20, 1878. The first seen in the following fall was on November 5. It is sometimes, though rarely, quite common, but it appears to be very irregular in its movements.

74285	♀ ad.	Stockton	Apr. 25, 1878
74286	♀ ad.	.....do	Apr. 25, 1878
76639	♀ ad.	.....do	Nov. 5, 1878

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165. Tringa minutilla, (Vieill.).—*Least Sandpiper.*

An abundant winter resident of the valleys. Is found at Stockton from about September 18 till the first of April.

76640	—juv.	Stockton.....	Fall, 1877

166. Gambetta melanoleuca, (Gm.).—*Tell-tale.*

The Tell-tale is rather common in spring and fall. I shot one May 23. It was first seen at Stockton April 15. I have not observed it since the first of November.

76635	— ad.	Stockton.....	Head only.
76636	— ad.	.....do	Do.

167. Gambetta flavipes, (Gm.).—*Yellow-legs.*

Of this bird I can only say that I shot one September 13, and a few days afterward saw what I thought was another.

76634	— ad.	Stockton.....	Sept. 13, 1878

168. Tringoides macularius, (Linn.).—*Spotted Sandpiper.*

This seems to be a rare bird in Central California. I saw three at Stockton in the spring of 1878, and the same number the following fall. It was first noticed at Stockton May 1. None were seen after October 3. It appears to stay with us about a month in spring and the same time in fall.

A bird of this species nightly visited a pond in the rear of the hotel at Murphy's in September, 1878. It came about dusk, after the Swallows and Flycatchers had retired and Bats had taken their places, and circled over the water as if catching flies, although it never made an abrupt curve or checked its rapid flight. It kept usually about three feet from the water, but went as high as six or eight feet occasionally.

75327	—juv.	Big Trees.....	Aug. 3, 1878

169. Numenius longirostris, Wils.—*Long-billed Curlew.*

I shot one of these birds at Stockton May 23. It is seen at rare intervals in winter, fall, and spring, but I do not know that it remains here all summer. I do not think I have seen it in this State later than May 23.

170. Numenius hudsonicus, Lath.?—*Hudsonian Curlew?*

In the spring of 1871, I shot at Marysville a small grayish Curlew, which was not *N. longirostris*, and may have been *N. borealis*.* It must be rare in this part of California. It was in a flock composed of others like it.

*As *N. borealis* has not yet been recorded from west of the Rocky Mountains, the species was probably *N. hudsonicus*.—R. R.

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Family ARDEIDÆ: The HERONS.

***171. Ardea herodias,** Linn.—*Great Blue Heron.*

An abundant constant resident.

***172. Herodias alba, β. egretta,** (Gm.).—*American Egret.*

This species was first noticed at Stockton, in the spring of 1878, on the 1st day of April. It is common in summer, and my impression is that it is a constant resident, as it remained here this year up to the 5th of December.* On the 7th of December, 1878, I saw a flock of forty or fifty at Stockton.

76641	— ad.	Stockton	Sept. 24, 1878

***173. Garzetta candidissima,** (Gm.).—*Lesser Egret.*

The first of this species observed after March 6, 1878, was a flock of seven or eight on May 21. It was rarely seen after October 4, and I supposed it had gone, but on the 20th of November I saw a flock of nearly a hundred. I have not noticed it since that time, though it may have gone to the centre of the tule swamps. It is an abundant summer resident at Stockton.

76642	— ad.	*Stockton	July —, 1877

***174. Butorides virescens,** (Linn.).—*Green Heron.*

The Green Heron is an abundant summer resident of the valleys. It was first seen at Stockton April 15, 1878, and disappeared in the first week of October.

Many built their nests in the willows by the San Joaquin River. I examined three nests. In one of them were six eggs; in the other two, four eggs each.

74300	♂ ad.	*Stockton	Apr. 15, 1878
74301	— ad.	Murphy's	May —, 1877

***175. Nyctiardea grisea, β. nævia,** (Bodd.).—*Black-crowned Night Heron.*

This Heron is a common resident of the valleys. I noticed it at Marysville in the winter of 1877–78.

74302	♂ ad.	*Stockton	May 1, 1878

***176. Botaurus lentiginosus,** (Montag.).—*American Bittern.*

The Bittern is a very abundant resident in the vicinity of Stockton. I also saw it at Marysville last winter.

76643	♂ ad.	*Stockton	Apr. 13, 1878

*The date of writing.—R. R.

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177. Ardetta exilis, (Gm.) —*Least Bittern.*

The Least Bittern is very rare,—certainly not often seen. I saw a straggler or migrant at Murphy's in the spring of 1877, and one at Stockton during the fall of 1878. These are all I have met with in two years.

76644	♀ juv.	Stockton..	Sept. 14, 1878	Taken from a *Buteo elegans.*

Family IBIDIDÆ: The IBISES.

178. Plegadis guarauna, (Linn.).—*White-faced Glossy Ibis; Bronzed Ibis.*

The Glossy Ibis was first seen at Stockton in the spring of 1878, on June 9, when three were noticed. A small flock was observed here on September 18.

I have shot it here, some years ago, as early as July or the first of August, and have seen several flocks July 25, 1870, in Sutter County. It is at times quite common in Sutter County in spring.

Family GRUIDÆ: The CRANES.

179. Grus canadensis, (Linn.).—*Sand-hill Crane.*

A common winter resident of the valleys, arriving the last of September and leaving about the first of May. I shot one at the Summit Meadows in August.

Family RALLIDÆ: RAILS, GALLINULES, and COOTS.

180. Rallus virginianus, Linn.—*Virginian Rail.*

This Rail appears to be a rare bird in California, though occasionally seen in winter.

76645	♀ ad.*	Stockton.....	Apr. 9, 1878

181. Porzana carolina, (Linn.).—*Sora Rail.*

I have seen but five or six of this species in California. One of them was shot in winter at Marysville.

182. Porzana jamaicensis, (Gm.)?—*Little Black Rail.*

I remember shooting a very small dark Rail at Stockton more than twenty years ago, and suppose it was this bird. It must be very rare.

***183. Gallinula galeata,** (Licht.).—*Florida Gallinule.*

A rare constant resident in the vicinity of Stockton. I have seen on an average about three annually.

76646	—juv.	*Stockton.....	Sept. 16, 1878

* Web of mouth, eyelids, or iris (or both) vermilion.

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***184. Fulica americana**, Gm.—*American Coot.*

The Coot is an abundant constant resident of the valleys. The only place where I have seen it in the foot-hills is Salt Spring Valley reservoir, between Milton, Calaveras County, and Murphy's, altitude about 1,200 feet, and there only in winter and spring.

76647	♂ ad.	*Stockton.....	Apr. 24, 1878

Family ANATIDÆ: The SWANS, GEESE, and DUCKS.

185. Cygnus americanus, Sharpless.—*Whistling Swan.*

I saw *C. americanus* in market November 6, 1878, and a few Swans flying in November, 1878.

The American Swan is the only Swan I have shot in California. I may add, however, that I have not shot many. Ten years ago I hunted all winter in Mason County, Illinois, and saw and heard Swans there which impressed me as being different from Swans I had shot here.*

186. Chen hyperboreus, (Pallas).—*Snow Goose.*

The Snow Goose is abundant in California in winter. It arrives in the valleys in October. Was first seen this year (1878) on the 12th of that month. It usually remains until about May 1.

187. Chen albatus, Cass.—*Lesser Snow Goose.*

Regarding this obscurely known species, which appears to bear to *C. hyperboreus* about the same relation that *Branta hutchinsi* does to *B. canadensis*, Mr. Belding's notes give the following valuable information:

"Shot at Stockton, Oct. 18, 1878. Weight, 3 lbs., 1 oz. Flesh light colored; iris bluish brown; bill deep black. No companion of its kind with it, but accompanied by a small flock of Mallard Ducks. I preserved the wings of one of this species at Marysville in the winter of 1874. It was killed during unusually cold weather, and the person who shot it said that it was alone. I left the wings with a shooting club, and last winter was told they had not been able to duplicate them! I was attracted by the dark centres of the tertials, their silky texture and their length. The color of the tarsi, their slenderness, and the color of the flesh—to say nothing of the plumage†—makes me think it a very different bird from *A. hyperboreus* (perhaps *A. albatus*). The tarsi were pale dirty blue, or bluish clay-color."

76654	—juv.	Stockton.....	Oct. 18, 1878

188. Chen rossi, (Baird).—*Ross's Snow Goose.*

[Mr. Belding says that according to the information of a friend, a sportsman residing in Stockton, this Goose is "quite common" on the San

*The latter were probably *C. buccinator*.—R. R.

†The last character, however, is of no importance, the *young* of *C. hyperboreus* having exactly the same colors.—R. R.

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Joaquin River, coming south with other Geese in the fall. It is said to become very tame when winged, following its captor after being kept a little while.—R. R.]

77163	—	ad.	Stockton market.....	Dec. —, 1878

189. Anser gambeli (Hartlaub).—*American White-fronted Goose.*

The White-fronted Goose was first seen at Stockton September 7, 1878, though rare until October. It is more abundant than any other of the Geese which visit California, usually coming first and leaving last.

Geese, in the aggregate, are very abundant in the valleys, and are in some localities so destructive to young wheat that farmers resort to various expedients to protect their grain from their ravages; among others, that of hiring hunters to ride over their fields and drive them away.

76651	—	ad.	Stockton?.....	Head only.

190. Branta canadensis, (Linn.).—*Canada Goose.*

This species usually arrives and departs at about the same time as the *Anser gambeli.* Toward the middle of March, when hunting in the foothills, sometimes not far below the snow-line, on pleasant sunny mornings, flocks of "Honkers" have often been seen, high above the hills, going toward the summit of the mountains, probably on their way to the valleys and lakes east of the Sierra Nevada.

76648	—	ad.	Stockton?.....	.....

191. Branta hutchinsi, *β.* **leucoparia**, (Brandt).—*White-cheeked Goose.*

[In regard to this species, Mr. Belding writes:—"I send head and wing of a 'brant,' which I cannot match with any of the descriptions in vol. ix, Pacific R. R. Reports. You must be well acquainted with it, as it is abundant in California in winter. It is by some called the 'Squawking Goose.' Tail-feathers 16."—R. R.]

76650	—	ad.	Stockton.....	.....	Head only.
76649	—	ad.	.....do	Dec. —, 1878	Head, wing, and tail.*

192. Dendrocygna fulva, (Gm.).—*Fulvous Tree Duck.*

This Duck is rarely seen in the interior at or north of Stockton. I have seen one in market here; also a fine specimen shot at Marysville last winter. It is said to be more common in the southern part of the San Joaquin Valley.

***193. Anas boschas**, (Linn.).—*Mallard; Green-head.*

The Mallard is a common constant resident of the valleys, and a few breed in the lakes of the Upper Sierras. It is sometimes abundant in

* "Squawking Goose. Rarely grows any larger."

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the valleys in winter, and is at that time an occasional visitant to the creeks and ponds in the foot-hills. A brood of young was noticed at Stockton May 9, 1878.

***194. Chaulelasmus streperus**, (Linn.).—*Gadwall.*

The Gadwall is a common constant resident of the valleys. Its favorite haunts are the tule swamps, both in summer and winter.

195. Nettion carolinensis, (Gm.).—*Green-winged Teal.*

The Green-winged Teal is a common, sometimes abundant, winter sojourner of the valleys, where it remains from about September 15 to April 15. It is an occasional winter visitant to the foot-hills, as high as Murphy's.

***196. Querquedula cyanoptera**, (Vieill.).—*Cinnamon Teal.*

This Duck begins to arrive about March 1, and from about April 1 to October is quite common in the tule marshes. A few remain as late as October 15.

74204	♂ ad.	*Stockton	Apr. 13, 1878
74205	♂ ad.	do	Apr. 8, 1878
74206	♀ ad.	do	Apr. 8, 1878

197. Mareca americana, (Gm.).—*Bald-pate; American Widgeon.*

The Widgeon is an abundant winter sojourner of the valleys, at which time it occasionally visits the foot-hills. A pair were seen at Stockton as late as May 28, 1878.

198. Dafila acuta, (Linn.).—*Sprig-tail; Pin-tail.*

The Sprig-tail is a common winter sojourner of the valleys. A pair was observed on May 28, 1878, at Stockton. There was at that time a slight rise in the river. Few, if any, breed here.

199. Spatula clypeata, (Linn.).—*Shoveller; Spoon-bill Duck.*

The Spoon-bill Duck is a common, though never abundant, sojourner of the valleys in winter. It was not seen at Stockton after May 9 in the spring of 1878, though it generally remains as long as any of the winter ducks—in fact, is usually the last of them to leave.

***200. Aix sponsa**, (Linn.).—*Summer Duck; Wood Duck.*

The Wood Duck is a common resident of Central California. I have shot it in winter as high up as Murphy's.

201. Fulix marila, (Linn.).—*Scaup Duck; Greater Black-head.*

The Scaup Duck is a rather rare winter sojourner in the valleys.

76652	♂ ad.	Stockton	Apr. 1, 1878

202. Fulix affinis, (Eyton)?—*Lesser Black-head.*

I am not certain in regard to this species, but think I have seen many of them on the sloughs near Marysville in winter only.

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I can say nothing of *F. collaris*. Have shot it, I believe, at Stockton and Marysville.

203. Aythya vallisneria, (Wils.).—*Canvas-back Duck.*

The Canvas-back is quite common at Stockton and Marysville in winter, especially when the streams are high and gales prevail on the coast.

204. Aythya americana, (Eyton).—*Red-head.*

The Red-head is rather a rare winter visitant to the interior valleys of California.

205. Bucephala clangula, β. **americana**, (Bp.).—*American Golden-eye.*

Two of these Ducks were found in the Stockton market, February 5, 1879. It is a rare winter visitant here.

77165	♀ ad.	Stockton market	Feb. 5, 1879

206. Bucephala albeola, (Linn.).—*Buffle-head; Butter-ball.*

The Butter-ball is a somewhat rare winter sojourner at Marysville and Stockton.

207. Erismatura rubida, (Wils.).—*Ruddy Duck.*

The Ruddy Duck is usually common at Stockton in winter.

76653	♀ ad.	Stockton.....	Oct. 11, 1878	Head, wing, tail, and foot.

208. Mergus castor, β. **americanus**, (Cass.).—*American Sheldrake.*

209. Mergus serrator, (Linn.).—*Red-breasted Sheldrake.*

[Mr. Belding does not mention these species separately, or either of them, by name, but a note headed "*Mergus* ———" is to the effect that he "has shot *two species* of Fish Ducks" in California. They were most probably these species.—R. R.]

210. Lophodytes cucullatus, (Linn.).—*Hooded Sheldrake.*

The Hooded Merganser was quite often seen at Marysville last winter, but it was not numerous, nor have I ever seen it so. It is a winter sojourner of the valleys.

Family PELECANIDÆ: The PELICANS.

211. Pelecanus erythrorhynchus, Gm.—*American White Pelican.*

Pelicans are irregular winter visitors to Stockton and Marysville. I shot one at the former place, March 15, nearly three years ago, which was probably an adult male.

Family GRACULIDÆ: The CORMORANTS.

212. Graculus dilophus, β. **floridanus**, Aud.—*Double-crested Cormorant.*

Four Cormorants shot at this place in the spring of 1878 appeared to belong to the same species, and to resemble the Cormorant so common here (Stockton) in spring.

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They have probably sought more suitable ground. No Cormorants have been seen from September 6 to the present date (December 3), but formerly they were abundant at all seasons, particularly where sloughs penetrated the oaks of the uplands.

[NOTE.—I cannot distinguish these specimens, nor, indeed, other Californian ones, from Eastern examples referable to the so-called "*floridanus*."—R. R.]

76656*	♀ ad.	Stockton?	Apr. 6, 1878	Head only.
76655†	♀ ad.	.....do	Mar. 22, 1878	

213. Graculus violaceus, (Gm.).—*Violet-green Cormorant.*

I have seen *G. violaceus* at Marysville in the spring.

Family LARIDÆ: The GULLS and TERNS.

214. Larus californicus, Lawr.—*California Gull.*

Gulls rarely visit the vicinity of Stockton, and then only when there is a gale from the coast. The specimen sent is different from the Gulls which usually visit us. It was alone.

76657	— ad.	Stockton	‡Oct. 15, 1878

***215. Sterna forsteri**, Nutt.—*Forster's Tern.*

Forster's Tern was first seen at Stockton April 17, 1878, two days after which it became common. It left Stockton previous to September 7.

74289	♀ ad.	*Stockton	Apr. 17, 1878

***216. Hydrochelidon nigra**, (Linn.).—*The Black Tern.*

The Black Tern was first seen at Stockton April 24, 1878. It was abundant from that date until June 8, and probably later. It left Stockton before September 7.

74288	♀ ad.	*Stockton	Apr. 25, 1878

Family PODICIPIDÆ: The GREBES.

217. Æchmophorus occidentalis, (Lawr.).—*Western Grebe.*

I have seen four of these Grebes at Stockton during the present season (1878). I have shot four of them, two in spring, two in fall. Those

* "Iris green; eyelids bordered with rounded spots of bluish white."

† "Eyes sea-green; eyelids bordered with rounded spots of pale blue; interior of mouth metallic cobalt-blue, extending far down the throat, where it assumes a blackish hue."

‡ "Iris blue, or brown-blue; web of mouth and eyelids orange-red, like spot on mandible; legs and feet pale clay-fleshy."

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found in fall were shot with much less difficulty than the spring birds, perhaps because they were young. I do not know whether they breed here.

74460	♂ ad.	Stockton.....	June 3, 1878

218. Æchmophorus clarki, (Lawr.).—*Clark's Grebe.*

[There are no notes concerning this species.—R. R.]

74203	— ad.	Stockton.....	Apr. 26, 1878
76659	— ad.	.....do	Oct. 3, 1878
76658	— ad.	.....do	*Sept. 24, 1878

219. Dytes auritus, β. californicus, (Lawr.).—*American Eared Grebe.*

The bird shot at Murphy's and the one shot at Stockton are all I have seen of this species in two years.

73846	— ad.	Murphy's.....	Apr. 16, 1877	"Iris and eyelids red."
74461	♂ ad.	Stockton.....	May 9, 1878	Do.

220. Podilymbus podiceps, (Linn.).—*Thick-billed Grebe.*

The specimen sent was the only one seen at Murphy's in the spring of 1877. It was apparently only a visitant. I have seen them in the small lakes near the summit in fall, and they are not rare in the sloughs in the valleys in winter.

73847	— ad.	Murphy's.....	Spring, 1877

CATALOGUE OF A COLLECTION OF BIRDS OBTAINED IN GUADELOUPE FOR THE SMITHSONIAN INSTITUTION, BY MR. FRED. A. OBER.

By GEORGE N. LAWRENCE.

Mr. Ober collected in Guadeloupe during August and September, 1878, and sent to the Smithsonian 132 specimens of birds; in his notes he enumerates 45 species.

Early in October he engaged his passage to New York, and went on board the vessel, but she was detained in port for over two weeks by adverse winds, and did not arrive here until November 13. Mr. Ober left the United States in December, 1877, making an absence of nearly two years. The result of his explorations has proved to be quite as satisfactory as was expected.

While in Guadeloupe, Mr. Belanger gave him a copy of Dr. L'Herminier's catalogue of the birds observed in Guadeloupe; it enumerates 135 spe-

* "Bill bright yellow, except ridge; space before eye white; ridge of bill brown; iris orange. Length, 24.00."

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cies. I think it is of much interest, and the number of species being so greatly in excess of those reported by Mr. Ober, I have thought best to subjoin a copy of it.

As will be noticed, a large number of the species named in it, and not procured by Mr. Ober, are migrants, but yet of the others, there are many that might be supposed to exist there still. Through the exertions of Mr. Vitrac it is to be hoped the number of species given by Mr. Ober will be greatly increased, and some of those named by Dr. L'Herminier be rediscovered.

Catalogue des oiseaux observés à la Guadeloupe par le Docteur F. L'Herminier, de 1827 *à* 1844.

NOTA!—Les espèces marquées d'une croix ont également été observées à la Martinique.

× Falco peregrinus Gmel.
× ,, sparverius Gmel.
× ,, columbarius Gmel.
× ,, cyaneus Lesson.
,, haliaetus Gmel.
× Strix nudipes Daudin.
Psittacus purpureus Gmel.
Picus L'herminieri Lesson.
× Picus varius Wilson.
Cuculus minor Gmel.
× Crotophaga ani Lath.
× Alcedo torquata Lath.
× ,, alcyon Lath.
× Ornismya cristata Lesson.
× Trochilus granatina Lath.
× ,, holosericeus Lesson.
Cypselus (Acanthylis oxyura) Bonap.
,, collaris Wilson. (Hirundo pelagica.)
Caprimulgus virginianus Gmel.
Sciurus guadeloupensis.
× Nectarina antillensis Lesson.
× Sylvia varia Lath.
× Thriothorus littoralis Vieill.
Ramphocinclus tremulus Lafres.
× Turdus densirostris Vieillot.
× Turdus L'herminieri Lafres.
× Turdus montanus Lafres.
× ,, aurocapillus Lath.
Turdus superciliaris L'herm.
Ficedula canadensis Brisson.
× Muscicapa ruticilla Lath.
× ,, cinerea L'herm.
Muscicapa sp.
× Hirundo rufa Lin. Lath.
× ,, albiventris Vieillot.
× ,, riparia Linn.
× Pipra musica Gmel.
× Bombycilla cedrorum Vieill.
× Tyrannus matutinus Vieill.
,, sp.
Platyrinchus L'herminieri Less.
× Muscicapa olivacea Wilson.
× Quiscalus versicolor Vieillot.
× Fringilla noctis Gmel.
× Emberiza olivacea Gmel.
× ,, oryzivora Gmel.
× Loxia portoricensis Daud.
× Columba aurita Temm.
× ,, leucoptera.
× ,, leucocephala Lath.
× ,, martinica Gmel.
× ,, mystica Tem.
× ,, portoricensis Tem.
× ,, passerina Tem.
× Ortyx virginianus.
× Fulica atra Wilson.
× Gallinula galeata Bonap.
× Fulica martinicensis Gmel.
× Rallus crepitans Gmel.
× ,, carolinus Bonap.
× Charadrius pluvialis Lesson.
× ,, vociferus Wilson.
× ,, wilsonius.
× ,, semipalmatus Bonap.
× ,, helveticus Bonap.
× Vanellus cayennensis Bonap.
× Calidris arenaria.
× Himantopus nigricollis Vieill.
× Totanus flavipes Vieillot.
× ,, melanoleucus Vieillot.
× ,, semipalmatus Tem.
× ,, campestris Vieillot.
× ,, macularius Tem.
× ,, hypoleucus Tem.
× ,, melanopterus L'herm.
,, sp.
× Limosa hudsonica Swain.

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× Limosa Isabollina L'herm.
× Scolopax gallinago Wilson.
× Macrorhamphus griseus Bonap
× Tringa canutus Lin.
× ,, maculata Vieillot.
,, rufescens Vieillot.
× ,, schinzii Bonap.
× ,, pusilla Wilson.
× ,, pugnax Gmel.
× ,, semipalmata Wilson.
× ,, himantopus Bon.
× ,, interpres Gmel.
× Phalaropus Wilsoni Bon.
× Numenius hudsonicus Lath.
× ,, borealis Lath.
× ,, longirostris Wilson.
× Ibis falcinellus Vieillot.
× Ardea cayennensis Gmel.
× ,, herodias Wilson.
× ,, cœrulea Wilson.
× ,, garzetta Gmel.
× ,, virescens Lath.
× ,, egretta Gmel.
× Ciconia alba Tem.
× Platalea ajaja.
Podiceps carolinensis Lath.
× ,, Dominicanus Gmel.
× Sula fulica Vieillot.
× Tachypetes aquila Vieillot.
× Phaeton æthereus Lesson.
× Lepturus candidus.
× Lestris caribæus L'herm.
Larus atricilla Lesson.
× Sterna stolida Gmel.
,, galericulata.
,, hirundo Lin. Lath.
× ,, minuta Gmel.
,, bicolorata L'herm.
,, deplorans L'herm.
,, fuliginosa Gmel.
× ,, cantiaca Tem.
× ,, anglica Montague.
× ,, argentea.
Rhynchops nigra Tem.
× Procellaria diabolica L'herm.
× ,, mauping L'herm.
× Thalassidroma leachii Bonap.
× Puffinus major.
× ,, L'herminieri Less.
× ,, atterrimus L'herm.
× Anas boschas Lin.
× ,, arborea Lin.
× ,, cyanoptera Vieill.
× ,, Dominica Bonap. (Erismatura dominica.)
× Anas marila Lin.
× ,, americana Gmel.
× ,, acuta Lath.
× ,, clypeata Lath.

GUADELOUPE.

"This island is situated on the 16th parallel of latitude, and comprehends, under its general name of Guadeloupe, two islands, separated only by a narrow creek, called Rivière Salée. The larger, known as Guadeloupe, proper, is very mountainous, a ridge running its entire length, north and south. There are several extinct craters in this ridge of mountains (as many as fourteen, it is said), and in the southern termination is a volcano yet somewhat active. Smoke and steam and sulphur fumes are emitted, though there has been no eruption during the present century. Guadeloupe is well watered. More than fifty rivers descend from the mountains to the sea on either side. The forests are large and dense, but contain in them less animal life than one would expect.

"The adjacent island, called Grande Terre, is not quite so large as the other, being about 20 miles in length and 10 to 15 in breadth. It is low and flat, no elevation occurring of any height. This portion is well cultivated, and there are no forests or even tracts of wood.

"The formation of Guadeloupe, proper, is volcanic, while that of Grande Terre is of coral, though probably built upon volcanic tufa. The prin-

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cipal port, Point à Pitre, is situated near the Rivière Salée and in Grande Terre. It contains a small museum, the *Musée de Lherminier*, which, under the energetic superintendence of its *directeur*, Monsieur L. Vitrac, promises to become of importance.

"It was founded by the late Dr. L'Herminier, who was an ardent naturalist, and discovered many new birds in this island and Martinique, some 40 years ago. His collections, containing type-specimens, and all his manuscript notes (I cannot ascertain that he ever published the results of his observations), perished in a disastrous fire that swept over Point à Pitre a few years since. Few birds are, as yet, in the museum; but there are very excellent and complete collections of crustacea, etc., and many fine specimens of aboriginal implements. It owes much of its progressiveness to its present directeur, and to Messieurs L. Guesde and St. Félix Colardeau, both of whom, one in archæology and the other in ornithology, take active part in promoting its advancement.

"There are a few birds here I did not find in any other island. The most prominent one is the Woodpecker, locally known as the '*Tappeur*', and named by Lesson *Picus Lherminieri*. I made a special excursion to obtain this bird, which is not abundant anywhere, and only found in certain localities.

"Another bird, the '*Perdix croissant*,' I found in this island, not having seen it, or even heard of it, in any other. Of this species I brought three alive to New York, of which two survived the passage.

"My collections here were made during the months of August and September; in obtaining them I visited the volcano and all adjacent forests on the west side, a valley half way down the west coast, the north side of the island, and places contiguous to Point à Pitre, and about the southern end of Grande Terre.

"To the gentlemen named above and to Monsieur G. Hurd, the *Directeur d'Intérieur*, and the U. S. consul, Capt. Chas. Bartlett, I am indebted for assistance in various matters.

"FREDERICK A. OBER.

"BEVERLY, MASS., *Jan.* 1, 1878."

Fam. TURDIDÆ.

1. Margarops herminieri (Lafr.).

"'Pied jaune.'

"Length, ♂, 10½ in.; alar extent, 17; wing, 5½.

"Length, ♀, 10 in.; alar extent, 17; wing, 5⅜.

"A resident of the wooded hills and mountains; found in Dominica in the same localities as the Perdix, woods sufficiently free from underbrush to afford places for scratching. The places where they have disturbed the earth by scratching are frequently seen in the paths, where the woods are thick, and in the open forest. They will come quickly at

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the *call* if within hearing, but are shy, flying cautiously from tree to tree, never long at rest."

2. Margarops densirostris (Vieill.).

"'Gros grive.' Very shy.
"Length, ♂, 11¼; alar extent, 17¼; wing, 5½.
"Length, ♀, 11¼; alar extent, 17¼; wing, 5½.

3. Margarops montanus (Vieill.).

"'Grivette'.
"Length, ♂, 10 in.; alar extent, 15; wing, 5.
"Length, ♀, 9½ in.; alar extent, 15; wing, 5.
"More numerous than the large 'Gros grive'."

4. Cinclocerthia ruficauda, Gould.

"'Trembleur.' Not so abundant as in Dominica.
"Length, ♂, 10 in.; alar extent, 13; wing, 4.
"Length, ♀, 10 in.; alar extent, 13; wing, 4."

Fam. TROGLODYTIDÆ.

5. Thryothorus rufescens, Lawr.

"Wren."
"Length, ♂, 4¾ in.; alar extent, 6¾; wing, 2.
"Length, ♀, 4¾ in.; alar extent, 6¾; wing, 2.
"I found this bird only in the second growth of the hills, and in a wood in the flat portion of the island."

Fam. SYLVICOLIDÆ.

6. Siurus nævius (Bodd.).

"Water Wagtail. Rare and shy.
"Length, ♀, 6 in.; alar extent, 9½; wing, 3.
"In the mangroves bordering the Rivière Salée, near Point à Pitre."

7. Dendrœca petechia var. **melanoptera,** Lawr.

"'Jaune.' Male.
"Length, ♂, 5 in.; alar extent, 7; wing, 2¼; tail, 1⅞.
"Length, ♀, 4½ in.; alar extent, 7; wing, 2¼; tail, 1⅞.
"More numerous than in Dominica; with the two sparrows the bird most commonly met with in the gardens and coffee plantations. In the latter, I find it chiefly in the pois douce trees, which, originally planted as wind-breaks for the coffee plants' protection, seam the hills all around in long rows. These trees were the haunt of the sparrows in Dominica, and of the warbler that I found there. They bear a pea-like pod, containing seeds surrounded with a sweet pulp, hence their name: pois douce, or sweet bean."

Male: The crown as far as the occiput is of a brownish-rufous; the

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upper plumage is greenish-yellow; the middle tail-feathers, the outer webs and ends of inner webs of the others are dark olive, blackish along the shafts; the margins are pale yellow; the inner webs are clear light yellow, except at their ends; wing-coverts black, all margined with pale yellow; tertials and outer webs of the other quills black, inner webs of a lighter shade of black, having a grayish tinge; all the quills are edged with yellow, extending around the tips; under wing-coverts clear light yellow; sides of the head and of the throat light yellowish-rufous; all the under parts clear gamboge-yellow, marked with narrow stripes of dark rufous, except on the lower part of the abdomen and the under tail-coverts; upper mandible dark brown, the under plumbeous; tarsi and toes light hazel.

The female is rather darker above, and is without the rufous crown and longitudinal stripes below; it has the under mandible whitish.

This species most resembles var. *ruficapilla*, Gm., from St. Thomas, St. Croix, &c. Besides the striking feature of its black wings, it differs in being smaller, the wing measuring but two and a quarter inches, which in the other are two and a half; the tarsi and toes are more delicately formed; the tarsus measures $\frac{11}{16}$ in. against $\frac{13}{16}$ in. in *ruficapilla;* the rufous streaks below are narrower and darker; the color of the crown is darker than in specimens from St. Thomas and Porto Rico, and the yellow margins of the wing-coverts are not so wide.

In my investigation of this species I find *D. petechia* of my Dominica catalogue to be the same; that island is the nearest south of Guadeloupe, and not very distant. But at a further distance to the north in Antigua and Barbuda, the species of Golden Warbler proves to be var. *ruficapilla*, Gm., as might be expected; agreeing with specimens from St. Thomas and Porto Rico, considered to be the form entitled to that appellation.

In Martinique is found a very different form, viz., *D. rufigula*, Baird; in Barbadoes still another, *D. capitalis*, Lawr.

From St. Vincent and Grenada Mr. Ober sent no Golden Warblers.

8. Dendrœca plumbea, Lawr.

"Length, ♂, 5¼ in.; alar extent, 7½; wing, 2½.

"Length, ♀, 5¼ in.; alar extent, 7; wing, 2¼."

9. Setophaga ruticilla (Linn.).

"Length, ♂, 5½ in.; alar extent, 7½; wing, 2½.

"Length, ♀, 5¼ in.; alar extent, 7¼; wing, 2⅜."

Fam. VIREONIDÆ.

10. Vireosylvia calidris var. **dominicana**, Lawr.

"'Peow-peow.'

"Length, ♂, 6½ in.; alar extent, 9¾; wing, 3¼.

"Length, ♀, 6¼ in.; alar extent, 9¾; wing, 3¼.

"Known everywhere by its cry; frequenting chiefly trees bearing small seeds."

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Fam. HIRUNDINIDÆ.

11. Hirundo horreorum, Barton.

Fam. CŒREBIDÆ.

12. Certhiola dominicana, Taylor.

"'Sucrier.'

"Length, ♂, 5 in.; alar extent, 8; wing, 2½.

"Not so abundant as in Dominica, where indeed it is more numerous than in any other island. It seems to me that the adult males here are brighter than any I have found elsewhere."

When I examined the collections from Antigua and Barbuda, and determined the species of *Certhiola* from these islands to be *C. dominicana*, I quite forgot Prof. Baird's species *C. frontalis* (N. A. Birds, vol. i, p. 428) from Antigua. Upon a comparison of it now with a large series of *C. dominicana* from Dominica, I find some females precisely like the type of *C. frontalis*. There are specimens of both sexes having their fronts more or less white: it is probably a mark of immaturity. Prof. Baird's name of *frontalis* must therefore become a synonym of *dominicana*.

Fam. TANAGRIDÆ.

13. Euphonia flavifrons (Sparm.).

"'La petite Perrouche verte.'"

The subjoined description of the male was given to Mr. Ober when in Guadeloupe by Monsieur Colardeau.

"Length, 5 inches; extent, 8 inches.

"Bill. Short, thick, strong; black above, whitish-blue below; broad, almost triangular, slightly hooked at the end of upper mandible.

"Nostrils. Large, deep seated.

"Head. A beautiful bright yellow spot in front over the nostrils; from this yellow spot, which extends no higher than the eyes, the whole head is of a pretty shade of blue; this coloring extends to the back of the neck, where it curves somewhat towards the throat but not around the neck; the cheeks are bluish olive-green, more yellowish under the throat.

"Back. A uniform bright olive-green, becoming more yellow on the rump.

"Wings. Dusky black, tinged with olive along the outer vanes of quills; wing-coverts olive, streaked with black.

"Belly. Bright yellowish-olive; lighter near vent.

"Tail. Twelve feathers; dusky black tinged with dark olive; short, having two-thirds concealed above and below by feathers of rump and vent.

"Eyes. Black.

"Legs. Short, strong, dirty bluish color.

"Claws. Same color; back claw the strongest.

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"Tongue. Short, broad, and thick; split at the end.

"This bird feeds on small, soft, seedy berries; never eats grain or seeds like sparrows or Canary birds. Has no song, except a low chattering when feeding, and a plaintive cry when flying or alighting."

The female has the front of a lighter yellow than the male, and the black border narrower; the blue color on the head is not much different; sides of the head dull light green; upper plumage yellowish-green, gradually becoming more yellow on the rump and upper tail-coverts; throat pale dull yellow; under plumage greenish-yellow.

In pattern of coloration the sexes are alike, but the male can be distinguished from the female by the front being of an orange-yellow, and the black border which entirely surrounds this color being wider; the lores are black; the cheek-patch is deep blackish-green; the back is dark bronze-green; the rump is of a decided yellow, the throat of a clearer yellow, and the under plumage of a much brighter yellow.

This species was found in all the islands visited by Mr. Ober, except Antigua and Barbuda; it would seem not to be abundant in any of them, as in no instance were more than two examples obtained. Though in certain localities it is not uncommon, as Mr. Ober wrote from Guadeloupe that Dr. Colardeau informed him that sometimes it was quite abundant on his estate.

In Mr. Sclater's "Synopsis Avium Tanagrinum" (P. Z. S. 1856, p. 271), the male is described as having black upper plumage. I fully expected to receive some from Mr. Ober that were black above, and supposed those marked male to be immature, though in fine condition. I wrote to Mr. Ober, stating that the adult male was said to be black above, and to try and obtain it in that plumage; he replied that he had met with none so marked, and was informed by persons very familiar with the bird—notably Dr. Colardeau—that they had never seen any having black upper plumage.

Mr. Sclater (l. c.) is the only one I know of who has described the male; but at that time he considered Desmarest's types (♂ and ♀) in the Paris Museum (named by Bonaparte *E. sclateri*) to be the same as *flavifrons*. *E. sclateri* is now known to be a distinct species, and I believe is found only in Porto Rico; the male of this is black above. The male of *E. musica*, from St. Domingo, also has the upper plumage black; both of these have been somewhat mixed up with *E. flavifrons*, which no doubt led to the supposition that the male of that species had the upper plumage black.

An examination of the specimens sent by Mr. Ober from the different islands, together with the assertions of residents, I think, show conclusively that the adults of the two sexes are correctly described above.

Latham's description is supposed to be that of the female; but it is not so stated.

It may have been ascertained that the male of *E. flavifrons* had its upper plumage green; if so, I have never seen it so described.

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14. Saltator guadeloupensis, Lafr.

"'Grosbec.'

"Length, ♀, 9 in.; alar extent, 13; wing, $4\frac{1}{8}$.

"Not abundant; same habits and frequents same places as that of Martinique and Dominica."

Fam. FRINGILLIDÆ.

15. Loxigilla noctis (Linn.).

"'Père noir', ♂. 'Moisson', ♀.

"Length, ♂, $5\frac{1}{4}$ in.; alar extent, 9; wing, 3.

"Length, ♀, $5\frac{1}{2}$ in.; alar extent, $8\frac{3}{4}$; wing, $2\frac{3}{4}$.

"Rather numerous. The female of this species is here called the 'gros bec'; in the other French speaking islands the 'moisson'. In all, however, the 'père noir' is applied to the male. It was a long while before I found out that these two were the same species, they are so dissimilar. The young of the first year resembles the female, as I first surmised in St. Vincent and proved in Dominica."

16. Phonipara bicolor (Linn.).

"'Mangeur d'Herbes.'

"Length, ♂, $4\frac{1}{4}$ in.; alar extent, 6; wing, 2.

"Length, ♀, $4\frac{1}{4}$ in.; alar extent, $6\frac{1}{2}$; wing, 2."

Fam. ICTERIDÆ.

17. Quiscalus guadeloupensis, Lawr.

"'Merle.'

"For a long time, says my friend Monsieur St. Félix Colardeau, these birds might be found on the east bank of the Rivière des Bananiers, and never north of it. This remained a boundary line for many years, but at present the bird is spread over all the lowlands of the island. Very common in the island of Grande Terre, which is flat and low."

Male: The general plumage is of a deep purplish-violet; the wing-coverts have a decided green lustre; tail black, glossed with green; quills black, with a greenish tinge; bill and feet black.

Length (fresh), $10\frac{1}{4}$ inches; wing, 5; tail, 4; tarsus, $1\frac{5}{16}$.

Female: The crown is ashy-brown; hind neck and upper part of back olivaceous-brown; lower part of back and upper tail-coverts blackish-brown; wings and tail black, the latter slightly glossed with green; throat ashy-white, a narrow dusky line extends down on each side of it from the under mandible; lower part of neck and breast dark ash tinged with fulvous; lower part of abdomen, sides, and under tail-coverts smoky-brown; bill and feet black.

Length (fresh), $9\frac{1}{2}$ inches; wing, $4\frac{3}{4}$; tail, $3\frac{1}{2}$.

At first sight, this species appears much like *Q. inflexirostris* from Martinique, but it is a little larger and the bill is straighter. The

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plumage is more violaceous, and the tarsi and toes appear to be stronger than those of that species.

The females differ much in appearance, the female of *Q. inflexirostris* being above of a more decided brown, and having the under plumage grayer; the wings and tail are brown, but the single adult specimen of that species sent has the plumage much worn, which may account for its brown appearance.

From Dominica, intermediate between the habitats of the two forms, no species of *Quiscalus* is recorded.

Fam. TYRANNIDÆ.

18. Elainea martinica (Linn.).

"Length, ♂, 6¼ in.; alar extent, 10; wing, 3¼.

"Length, ♀, 6 in.; alar extent, 9; wing, 3.

"In the oleander and ponne rose hedges near Rivière Ronge, not abundant near Matouba."

Fam. TROCHILIDÆ.

19. Eulampis jugularis (Linn.).

"Garnet-throat Hummer.

"With the Violet-breast about equally distributed, almost solely in the mountains. The numerous flowers that are now in bloom attract it, with the other, but it is nowhere so abundant as in Dominica."

20. Eulampis holosericeus (Linn.).

"Violet-breast Hummer.

"Length, ♂, 4¼ in.; alar extent, 6¼; wing, 2½.

"Length, ♀, 3¾ in.; alar extent, 6; wing, 2.

"I saw in the Musée at Martinique a humming-bird much resembling this species, with the breast and throat the same, but having the chin for a half inch or so beneath the bill of the same garnet coloring as in the Garnet-throat, just as if a fragment of the gorget of the Garnet-throat had been removed from that bird and attached to this. I really thought it was a manufactured specimen, but a close examination failed to detect any defect. Mr. Belanger said there were others in the garden like it, but I never saw them, though I often hunted there. Mr. Belanger is a good botanist, but nothing of an ornithologist. Since Dr. L'herminier left nothing has been done respecting the birds of the islands. This specimen was a mounted one in a private case in the side building of the garden.

"Dr. Colardeau held that this is none other than the young of *E. jugularis*. He says he has had the young in a nest, and that they were all like this, and that the old female (which came to feed them) was exactly like the highest colored of this species."

21. Orthorhynchus exilis (Gm.).

"Length, ♂, 3½ in.; alar extent, 5; wing, 2.

"Length, ♀, 3½ in.; alar extent, 4½; wing, 2.

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"As in Dominica, this species is the most abundant and most generally distributed, though, as there, I find it more numerous in the higher hills. It seems to me that both species are here, the *exilis* and *ornatus*, as I have seen several with the darker throat."

Fam. CYPSELIDÆ.

22 Cypseloides niger (Gm.).

"Swallow.

"Length, ♂, 6¾ in.; alar extent, 15¼; wing, 6."

Fam. ALCEDINIDÆ.

23. Ceryle alcyon (Linn.).

"Ceryle."

24. Ceryle torquata (Linn.).

"This bird appeared in the list given me by Mr. Belanger, of the Jardin des Plantes, Martinique, but I doubted if it was obtained in Guadeloupe. I was assured, however, by Monsieur L. Vitrac, the conservateur of the Musée de L'Herminier, that he had shot that same species here. There are two, a male and a female, in the Musée."

Fam. PICIDÆ.

25. Melanerpes l'herminieri (Less.).

"Picus L'herminieri. 'Tappeur.'

"Length, ♂, 11 in.; alar extent, 18; wing, 5½.

"Length, ♀, 10½ in.; alar extent, 17; wing, 5¼.

"The only island in which I have seen a Woodpecker of any species."

"This species frequents the hills and mountains; it is not common; in its habits reminding me of the Hairy Woodpecker of the North. Iris reddish-chocolate."

Fam. CUCULIDÆ.

26. Coccyzus minor (Gm.).

"'Cuckoo manioc' in all islands.

"The second growth on the hills, where once flourished the coffee-trees, affords a good feeding ground for this species, but it is not abundant in these higher hills. I saw one to-day (Aug. 30) in some high trees, in the mountains, feeding, and occasionally crying out. It is little attracted by my bird call, though manifestly disturbed by it, as I drew it from one tree-top to another, though too high to shoot."

Fam. FALCONIDÆ.

28. Tinnunculus sparverius var. antillarum (Gm.).

"T. sparverius. 'Gli gli.'

"Length, ♂, 10 in.; alar extent, 18; wing, 6½.

"Length, ♀, 11 in.; alar extent, 21; wing, 7¼.

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"In Dr. L'Herminier's catalogue as furnished me by M. Belanger of the Jardin des Plantes, Martinique, there are six species of hawks, viz, *Falco peregrinus* (*F. sparverius*, *F. tinnunculus*), *F. columbarius*, *F. cyaneus*, *F. haliaëtus*. The 2nd and 3rd are undoubtedly the same. I have seen the Duck Hawk in the Museum of the Jardin des Plantes, Martinique, and the Pigeon Hawk, but whether they were from that island or not, I cannot tell, neither could M. Belanger, the Directeur, as there were birds from Cayenne as well, and from France. Doubtless, in the 35 years since the collection of Dr. L'Herminier was finished, many changes have taken place in the fauna of the island; that I do not find all found by him is not strange either, as he had the advantage of 30 years' residence in the island. I do not know if any printed list of the birds collected by him is in existence; M. Belanger said not, that this list was from a manuscript list in the Musée."

Fam. PHÆTHONTIDÆ.

28. Phæthon æthereus (Linn.).

Fam. ARDEIDÆ.

29. Butorides virescens (Linn.).

"Green Heron. 'Chaugh.'

"Abundant in the mangrove swamps."

30. Nyctiardea violacea (Linn.).

"N. violaceus."

Fam. COLUMBIDÆ.

31. Columba corensis, Gm.

"Ramier.

"Length, ♂, 15 in.; alar extent, 24; wing, 8.

"Not so abundant as in Dominica and Grenada."

32. Zenaida martinicana, Bp.

"Tourterelle.

"Found mostly on the Grande Terre, the lowland among the canes and in the mangroves along the rivers where they breed."

33. Chamæpelia passerina (Linn.).

"Ortolan.

"Abundant, especially in the mangrove swamps bordering sugar plantations, where it breeds and seeks refuge when disturbed."

34. Geotrygon mystacea (Temm.).

"'Perdix croissant.'

"Length, ♂, 11¾ in.; alar extent, 20; wing, 7.

"This is a Perdix more brilliantly colored than the 'Perdix rouge' and

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a trifle larger. It derives its name from a white crescent-shaped stripe under the eye. The feathers of the breast have metallic reflections much different from the P. rouge. The iris, too, is blood-red, and there are many material differences which stamp it as a different species altogether. The 'Perdix noir' is the female of the P. rouge, and has peculiarities in common. Whether the males and females of this species differ I cannot tell, having as yet (Sept. 27) no specimens to dissect. I have two Perdix on board in a cage in mutilated plumage, which I shall try to carry home alive. At the 'Hotel des Bains' are eight in beautiful plumage; they take kindly to captivity and thrive. I do not know whether they mate and breed in confinement. They live in the mountains, habits same as the Perdix rouge; caught in springes."

Mr. Ober brought three living examples of this species to New York, which he kindly presented to me. One died soon after its arrival, and on examination proved to be a female; there is no noteworthy difference of plumage between this and the male sent in Mr. Ober's collection.

The other two specimens, which from their actions I judge to be male and female, are alike in plumage; for the past three months they have been in the Central Park Menagerie, where they appear to be contented and in good health.

Fam. RALLIDÆ.

35. Rallus crepitans, Gm.

"Rallus."

36. Gallinula galeata (Licht.).

"'Poule d'eau.'"

Fam. CHARADRIIDÆ.

37. Charadrius virginicus, Borkh.

"Golden Plover."

38. Ægialitis semipalmata (Bp.).

"Ring-neck Plover.

"Length, ♀, 7 in.; alar extent, 15; wing, 5.

"All the Plovers and Sandpipers that visit the Antilles are found here."

Fam. SCOLOPACIDÆ.

39. Tringa maculata (Vieill.).

40. Ereunetes petrificatus (Ill.).

"Peep."

41. Rhyacophilus solitarius (Wils.).

"Sandpiper."

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Fam. LARIDÆ.

42. Larus atricilla, Linn.

"Larus."

43. Sterna maxima, Bodd.

"Sterna elegans?"

44. Sterna dougalli, Mont.

"'Mauve à bec noir.'"

45. Sterna fuliginosa (Gm.).

"Sooty Tern."

In the collection is a full-grown specimen of the young of this species, in dark plumage; it is entirely of a smoky black, with the exception of the inside of the wings and a space on the lower part of the abdomen; the feathers of the back and wings are conspicuously margined with white.

This completes the series of catalogues of the birds ascertained by Mr. Ober to inhabit the islands of the Lesser Antilles visited by him.*

The result has been of very great value, and has contributed much to the knowledge of the ornithology of the islands explored. There was no perfect knowledge of the avifauna of any, and of some we knew absolutely nothing.

Yet the work is incomplete; there are several islands that were not visited, and in some of those explored there are species known to inhabit them that have not been identified.

As so much has been accomplished, it is to be hoped that ere long an investigation of the islands not examined by Mr. Ober will be undertaken.

NEW YORK, *December* 31, 1878.

ON TWO FISHES FROM THE BERMUDAS MISTAKENLY DESCRIBED AS NEW BY DR. GÜNTHER.

By G. BROWN GOODE.

In the February number of the Annals and Magazine of Natural History is published a paper by Dr. Günther, describing two "new" species of fishes from the Bermudas,† collected by Mr. J. Matthew Jones, and which, as a well-merited compliment to the naturalist who has so thoroughly and enthusiastically explored those islands, he has christened *Gerres Jonesii* and *Belone Jonesii*. Strangely enough, both species had

* Those preceding it are as follows: Dominica, p. 48; St. Vincent, 185; Antigua and Barbuda, 232; Grenada, 265; and Martinique, 351.

† On two new Species of Fishes from the Bermudas. <Ann. and Mag. Nat. Hist. (5th series), iii, 1879, [Feb.], pp. 150–151.

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previously been described by the writer; the latter under the very same name which is now proposed by Dr. Günther. A detailed description of *Belone Jonesii* was published in October, 1877, in the American Journal of Science and Arts.* Dr. Günther's description of *Belone Jonesii* and my own coincide in all essential details, and, furthermore, I had the opportunity of seeing Mr. Jones's specimens on the day they were collected and before they were put in spirits. My specimens were collected within a few days of the same time, and from the same locality.

Gerres Jonesii, Gthr., is apparently identical with the species described by me in 1874 under the name *Diapterus Lefroyi*,† and subsequently referred to in the Catalogue of the Fishes of the Bermudas‡ as *Eucinostomus Lefroyi*.

This species was discovered in Cuban waters at nearly the same time by Prof. Felipe Poey, and was by him named *Eucinostomus productus*.§

DESCRIPTION OF A SPECIES OF LYCODES (L. TURNERI) FROM ALASKA, BELIEVED TO BE UNDESCRIBED.

By TARLETON H. BEAN.

The first species of the genus *Lycodes* known from the North Pacific is in the United States National Museum, where it was sent by Mr. Lucien M. Turner, who took it at St. Michael's, Alaska, March 28, 1876. There is no record of the depth at which it was taken. The single specimen secured is 330 millimetres (13 English inches) in length, and is well preserved. This is one of six species described as scaleless—*polaris* (Sabine), 1820, length of type 7 English inches; *mucosus*, Rich., 1855, types 7 and 11 inches; *Rossi*, Malmgren, 1864, type 32 millimetres; *gracilis*, M. Sars, 1866, type 43 millimetres; *Sarsii*, Collett, 1871, type 44 millimetres, being the other five. I have brought together *polaris*, *mucosus*, *Verrillii*, and *Turneri* in a table of comparative measurements, so that the relations of the North American species may be seen at a glance. It is difficult to determine the exact relations of all the species of *Lycodes* of the Arctic and Subarctic regions, since nearly half of them were described from small individuals; but, so far as the original descriptions and measurements furnish a guide, *L. Turneri* is quite different from all the rest.

The species is dedicated to Mr. Lucien M. Turner, to whose diligence the Museum is indebted for large and valuable additions to its collections from Alaska.

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*A Preliminary Catalogue of the Reptiles, Fishes and Leptocardians of the Bermudas, with Descriptions of four Species of Fishes believed to be new. <Amer. Journ. Sci. and Arts, xiv, 1877, (Oct.), pp. 289–298, (p. 295).

†Amer. Journ. Sci. and Arts, vii, 1874, (Aug.), p. 123.

‡Catalogue of the Fishes of the Bermudas, p. 82.

§Enumeratio Piscium Cubensium, . . . Madrid, 1875–76. p. 55.

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DESCRIPTION.—The greatest height of the body is contained $8\frac{1}{2}$ times, and its width just behind the pectorals 9 times, in total length. The greatest circumference equals 3 times the height. The height at the ventrals equals the width immediately behind the pectorals. The height at the vent is contained $10\frac{1}{2}$ times in total length, and the width at the same place is contained $4\frac{1}{3}$ times in the length of the head.

The head is depressed; its greatest width equals $\frac{3}{4}$ of its length, which is contained $4\frac{1}{3}$ times in total length. The distance from the tip of the snout to the nape is nearly equal to the greatest width of the head, or $\frac{1}{5}$ of total length. The distance between the eyes equals $\frac{1}{4}$ of the distance from the snout to the nape. The nostrils are tubular, nearly as far apart as the eyes, and slightly farther from the eyes than from each other. The length of the upper jaw equals half the length of the head, the maxilla extending to the vertical through the hind margin of the orbit. The mandible is twice as long as the snout, and extends beyond the vertical through the hind margin of the orbit. On the intermaxillaries there is one full series of teeth, and in front of these a few smaller teeth form an outer imperfect series. There is a naked space at the symphysis, and the first tooth on each side of this is larger than all the rest. There is one complete series on the mandible, and in front of it, about the symphysis, are two irregular short series. A few teeth are in a cluster on the head of the vomer. The palatines have a short single series. All of the teeth are slender, slightly recurved, and a little worn at the points. The distance from the snout to the orbit is twice the length of the ventral, equals the length of the longest dorsal ray, and $\frac{1}{3}$ of the distance of the ventral from the snout. The long diameter of the eye is contained 9 times in the length of the head.

The distance from the tip of the snout to the beginning of the dorsal is $\frac{1}{4}$ of the total length. The length of the first dorsal ray is contained 5 times, and of the longest $3\frac{2}{7}$ times in the length of the head.

The distance from the tip of the snout to the beginning of the anal is slightly more than $\frac{1}{2}$ of the total length; the vent is in the middle of the total length, immediately behind the third cross-band and under the 21st ray of the dorsal; the distance from the origin of the ventrals to the vent equals twice the length of the pectoral. The first anal ray is contained $5\frac{3}{4}$ times in the length of the head, and the longest, $4\frac{1}{2}$ times.

The extended pectoral reaches the 10th ray of the dorsal; the distance of its base from the snout is contained $4\frac{1}{3}$ times, and its length $6\frac{2}{3}$ times in the total length.

The distance of the ventral from the tip of the snout is 3 times the distance from the snout to the orbit, and is contained $4\frac{1}{3}$ times in the total length. The length of the ventrals is contained $6\frac{1}{7}$ times in the length of the head, and twice in the distance from the tip of the snout to the orbit; they extend to a vertical through the anterior margin of the base of the pectoral.

Radial formula: B. VI; D. (including half of caudal) 85; A. (including half of caudal) 67; P. 18; V. 3.

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Color: The ground-color is light umber; abdomen grayish brown; lower parts of head cream. A band of cream on the anal extends from the origin of the rays to about their middle. A crescentic band of the same color, mottled with umber, crosses the nape, and continues behind the pectorals, blending there with the first lateral band. A streak of cream, more or less interrupted by umber, extends backwards from the eye across the cheek, almost to the end of the operculum. Ten bands of cream-color, bordered with dark umber, start from the tips of the dorsal rays and extend into the lower half of the body, becoming wider and somewhat broken below the middle of the body. These cross-bands are located at the second, ninth, seventeenth, twenty-fifth, thirty-fourth, forty-third, fifty-second, sixtieth, sixty-eighth, and seventy-seventh dorsal rays. There is, besides, a very indistinct caudal tip of cream-color.

In the table of proportions appended, a statement appears as to how many times the length of different parts of the body is contained in the total length, or in the length of the head, when that seems more convenient.

Table of Measurements.

	Lycodes mucosus.		L. Verrillii.		L. Turneri.	
Current number of specimen	16,930.		21,013.		21,529.	
Locality	Cumberland Gulf.		Off Nova Scotia.		St. Michael's, Alaska.	
	Millim.	100ths.	Millim.	100ths.	Millim.	100ths.
Length to end of middle caudal rays	430	.....	127	.....	330	.....
Body:						
Greatest height	.....	*12½	.....	8	.....	†12
Greatest width	.....	‡11	.....	8	.....	‡11
Width at vent	.....	3½	.....	.....	.....	5½
Height at ventrals	.....	13	.....	.....	.....	11
Height at vent	.....	8 7/10	.....	.....	.....	9½
Head:						
Greatest length	.....	28	.....	17½	.....	23
Distance from snout to nape	.....	20	.....	.....	.....	10
Greatest width	.....	17½	.....	11	.....	17
Width of interorbital area	.....	4½	.....	4	.....	4
Length of snout	.....	9½	.....	6½	.....	6½
Distance of nostrils from eye	.....	6½	.....	.....	.....	.....
Length of upper jaw	.....	16	.....	8½	.....	11½
Length of mandible	.....	15	.....	.....	.....	13
Distance from snout to orbit	.....	9½	.....	.....	.....	7
Long diameter of eye	.....	2½	.....	3	.....	2½
Dorsal:						
Distance from snout	.....	31	.....	26	.....	25
Length of first ray	.....	5	.....	.....	.....	4½
Length of longest ray	.....	7	.....	.....	.....	7
Anal:						
Distance from snout	.....	55	.....	35½	.....	51
Length of first ray	.....	3	.....	.....	.....	4
Length of longest ray	.....	6½	.....	.....	.....	5½
Pectoral:						
Distance from snout	.....	28½	.....	18	.....	24
Length	.....	15	.....	8½	.....	15
Ventral:						
Distance from snout	.....	28	.....	16½	.....	21
Length	.....	2½	.....	1½	.....	3½
Branchiostegals	VI	.....	.....	.....	VI	.....
Dorsal	90	.....	92	.....	85	.....
Anal	71	.....	88	.....	67	.....
Pectoral	18	.....	15	.....	18	.....
Ventral	3	.....	.....	.....	3	.....

*At pectorals. †Near middle of body. ‡Behind pectorals.

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Table of Proportions of North American Species.

	Lycodes polaris.	L. mucosus.	L. Verrillii.	L. Turneri.
Current number of specimen		16,930.	21,013.	21,529.
Locality		Cumberland Gulf.	Off Nova Scotia.	St. Michael's, Alaska.
	Times in total length.	Times in total length.	Times in total length.	Times in total length.
Length to end of middle caudal rays	"7 inches"	430mm	127mm	330mm
Body:				
Greatest height		8	12 7/10	8 1/2
Greatest width		9	12 7/10	9
Width at vent		(in head) 8	(in head) 8 1/2	(in head) 4 1/2
Height at ventrals		8	13 1/2	9
Height at vent		11 1/2	14 1/2	10 1/2
Head:				
Greatest length		3 1/2	5 1/2	4 1/2
Distance from snout to nape		5	8 1/2	6
Greatest width		5 1/2	9	6
Width of interorbital area		(in head) 6	(in head) 4 1/2	(in head) 5 1/2
Length of snout		(in head) 3	(in head) 2 2/4	(in head) 3 1/2
Distance of nostrils from eye		(in head) 4 1/2	(in head) 5	(in head) 5
Length of upper jaw		(in head) 1 3/4	(in head) 2	(in head) 2
Length of mandible		6 3/4	12	7 3/4
Distance from snout to orbit		10 1/2	21	14 1/2
Long diameter of eye		(in head) 10 3/4	(in head) 5 1/2	(in head) 9
Dorsal:				
Distance from snout		3 1/2	4	4
Length of first ray		(in head) 5 3/4	(in head) 5	(in head) 5
Length of longest ray		(in head) 4	(in head) 3 1/2	(in head) 3 1/2
Anal:				
Distance from snout		1 8/11	2 1/2	2
Length of first ray		(in head) 9	(in head) 6 1/2	(in head) 5 3/4
Length of longest ray		(in head) 4 1/3	(in head) 4	(in head) 4 1/2
Pectoral:				
Distance from snout		3 1/2	5 1/2	4 1/2
Length	(*)	6 3/4	11 1/2	6 3/4
Ventral:				
Distance from snout		3 1/2	6	4 1/2
Length		(in head) 11	(in head) 11	(in head) 6 1/2
Scales	None.	None.	(†)	None.
Dorsal		90	92	85
Anal		71	88	67
Pectoral	15	18	15	18
Ventral	2 spines (!)	3	5	3

*Exceeds twice its breadth. † Upper part of dorsal and all of anal naked; the rest scaly.

DESCRIPTIONS OF NEW SPECIES AND RACES OF AMERICAN BIRDS, INCLUDING A SYNOPSIS OF THE GENUS TYRANNUS, CUVIER.

By ROBERT RIDGWAY.

I.—*Synopsis of the Genus Tyrannus, Cuvier.*

Genus TYRANNUS, Cuvier.

Tyrannus, "Cuv., Leçons Anat. Comp. 1799, 1800" (Agassiz). Type, *Lanius tyrannus*, Linn. †—Vieill., Ois. Am. Sept. I, 1807, 73.—Swains., Classif. B. II, 1837, 225.—(=) Baird, B. N. Am. 1858, 170.—(>) Caban. & Heine, Mus. Hein. II, 1859, 79 (restricted to *T. carolinensis;* includes also *Pitangus caudifasciatus!*).—(=) Gray, Hand-list, I, 1869, 364.—(=) B. B. & R., Hist. N. Am. B. II, 1874, 314.

"*Drymonax*, Gloger, 1827" (*Cabanis & Heine*).

"*Myiarchus*," Burm. 1850" (nec Caban. 1844).

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Dioctes, REICHENB., Av. Syst. Nat. 1850, pl. 66, fig. (type, *D. pyrrholæma*, Reichenb., = *Tyrannus carolinensis* ?; no description!).

Satellus, REICHENB., l. c. (type, *Tyrannus vociferans*, Swains. ?; no description).

> *Laphyctes*, REICHENB., l. c.—CABAN. & HEINE, Mus. Hein. II, 1859, 76 (includes *T. melancholicus*, *T. "satrapa"*, *T. apolites*, *T. vociferans*, and *T. verticalis*).

> *Melittarchus*, CABAN., J. f. O., Nov. 1855, 477 (type, *Tyrannus magnirostris*, D'Orb.; includes also *T. crassirostris* and *T. dominicensis*).—CABAN. & HEINE, Mus. Hein. II, 1859, 80.

GEN. CH.—Tyrant-birds of large, medium, or rather small size, with strong, conical bills, strongly bristled rictus, even, emarginated, or slightly rounded tail, and the ends of the outer primaries abruptly narrowed (except in *T. luggeri*). Crown with a concealed colored crest (red, orange, or yellow); plumage without streaks or bars.

The above brief diagnosis, although imperfect, will suffice to distinguish the members of *Tyrannus* from those of allied genera. *Milvulus* agrees in the attenuation of the outer primaries, the colored crest, and many other features, but the tail is excessively forked, the lateral feathers twice or more as long as the middle pair. *Pitangus* is also quite similar in many respects, but has the bill more elongated, less depressed, the outlines straighter, while there are various other differences. Upon the whole, the genus may be considered quite a natural group.

The species vary among themselves not only in colors, but in other respects also, each one (with a single exception so far as I know*) having its own peculiarities of external form, so that were all identical in coloration they could even then be readily distinguished. Attempts have been made to subdivide the genus, but all have proved unsatisfactory. There is, truly, a vast difference in size and form between the robust, almost gigantic, *T. magnirostris*, and the little *T. aurantio-atrocristatus*; but other species are variously intermediate, so that it seems best to consider the variations of form and size in this genus as of mere specific importance.

Conspectus Tyrannorum.

A. White beneath, the chest shaded with pale grayish (very faint in *T. magnirostris*).

a. Tail distinctly emarginate at end. Bill very large, much longer than tarsus (measuring from nostril to tip). Tail not sharply tipped with white (= *Melittarchus*, Cabanis, part).

1. Wing, 5.20–5.30; tail, 4.00–4.25; bill, from nostril, 1.00–1.05, its depth at base .42–.46, width .60–.64; tarsus, .88; middle toe, .72. Grayish brown above, the head blackish snuff-brown. *Hab.*—Cuba; Bahamas. T. MAGNIROSTRIS.

2. Wing, 4.70–4.75; tail, 3.85–4.20; bill, from nostril, .92–.95, its depth .34–.40, width .58–.60; tarsus, .70; middle toe, .58–.62. Plumbeous-gray above, the head similar. *Hab.*—Guiana, Trinidad, Isth. Panama (?), and Lesser Antilles ..... T. ROSTRATUS.

3. Wing, 4.45–4.80; tail, 3.50–4.05; bill, from nostril, .75–.82, depth .30–.36, width .47–.55; tarsus, .70–.75; middle toe, .52–.60. Colors of *rostratus*, but somewhat lighter plumbeous above. *Hab.*—West Indies and adjacent coasts ..... T. DOMINICENSIS.

*T. *rostratus* and *T. dominicensis* are alike in the details of structure.

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b. Tail slightly rounded. Bill small, much shorter than tarsus (measuring from nostril to tip). Tail sharply tipped with white (=*Tyrannus*, as sometimes restricted).

4. Wing, 4.45–4.75; tail, 3.40–3.75; bill, from nostril, .50–.57, depth .24–.27, width .37–.40; tarsus, .70–.78; middle toe, .55–.60. Dark plumbeous above, the head and tail black. *Hab.*—Eastern North America; south to Panama.....T. CAROLINENSIS.

B. Yellow beneath, grayish or whitish anteriorly.

a. End of outer primaries more or less attenuated (=*Laphyctes* and *Satellus*, Reichenbach, and *Melittarchus*, Cabanis, part).

5. Bill excessively stout, all its outlines convex. Tail even or faintly emarginate. Wing, 5.00–5.50; tail, 4.00–4.50; bill, from nostril, .75–.81, breadth .53–.60, depth .38–.43; tarsus, .72–.78; middle toe, .63–.68. Above olivaceous-gray, the wings and tail browner, the head darker; crown-patch lemon-yellow; malar region, chin, and throat white, the jugulum faintly ashy; rest of lower parts sulphur-yellow. *Hab.*—Mexico. T. CRASSIROSTRIS.

6. Tail decidedly emarginate. Wing, 4.25–4.85; tail, 3.70–4.50; bill, from nostril, .60–.77, breadth .40–.52, depth .24–.35; tarsus, .60–.80; middle toe, .56–.60. Head light ash-gray, lighter beneath, the throat sometimes quite white; back, etc., greenish gray; wings and tail dusky, with lighter edgings; lower parts, including breast, rich lemon- or gamboge-yellow, the breast tinged with olive. *Hab.*—The whole of Tropical America, except West Indies.....T. MELANCHOLICUS.

7. Tail decidedly emarginate. Wing, 4.00; tail, 3.42; culmen, .60; middle toe, .50. Similar to *melancholicus*, but cheeks and throat pure white, the wing-edgings whitish green, instead of light cinereous. *Hab.*—Northern forest-region of Brazil.....T. ALBIGULARIS.

8. Tail decidedly emarginate; wing, 4.00; tail, 3.65; culmen, .65; tarsus, .60; middle toe, .50. Above brown, washed with olive-gray, the back indistinctly spotted with darker. Head cinereous, the feathers of the bright yellow crown-patch tipped with black. Wings and tail brown, the remiges edged with whitish, the outer tail-feathers with rusty. Throat cinereous; breast and belly sulphur-yellow. *Hab.* ——? T. APOLITES.

9. Tail ——? Wing, 4.10; tail, 3.10. Above cinereous, the back suffused with olive; crown-patch yellow; wings and tail black, edged with whitish; upper tail-coverts black, edged with olive. Beneath pale yellow, the throat and fore-neck pure white, the breast washed with gray. *Hab.*—Ecuador.....T. NIVEIGULARIS.

10. Tail even. Wing, 4.75–5.25; tail, 3.65–4.00; bill, from nostril, .50–.55, width .35–.38, depth .25–.28; tarsus, .68–.77; middle toe, .55–.58. Head, breast, and back cinereous, paler beneath, the chin nearly white, the back washed with light olive-green. Wings brownish dusky, indistinctly edged with paler; upper tail-coverts and tail black, the outer pair of rectrices with their outer webs white, in marked contrast. Abdomen, anal region, and crissum sulphur-yellow; lining of wing light grayish yellow. Crown-patch deep orange-red. *Hab.*—Western United States and Western Mexico.....T. VERTICALIS.

11. Tail even. Wing, 5.00–5.40; tail, 3.70–4.20; bill, from nostril, .55–.60, width .35–.45, depth .27; tarsus, .72–.78; middle toe, .55–.60. Head and jugulum deep cinereous, the chin whitish; back and breast olivaceous-gray, lighter beneath. Wings light brownish-gray, with paler edgings. Upper tail-coverts and tail black, the tip of the latter and the outer webs of the lateral rectrices pale grayish, sometimes nearly white. Abdomen, anal region, and crissum sulphur-yellow; lining of the wing sulphur-yellow.

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Crown-patch deep orange-red. *Hab.*—Central America, Mexico, and Southwestern United States; northward along eastern base of Rocky Mountains as far as the 40th parallel; south to Costa Rica.....T. VOCIFERANS.

b. End of outer primaries not at all attenuated.

12. Tail even, or very faintly emarginated. Wing, 4.15–4.25; tail, 3.25–3.30; bill, from nostril, .52, width .40, depth .28–.32; tarsus, .75–.80; middle toe, 65. Head dull cinereous, with an indistinct grayish-white streak above the auriculars. Crown-patch pure gamboge-yellow. Throat pure white centrally, streaked with ash-gray laterally and across the jugulum; sides of breast deep olivaceous; rest of lower parts deep gamboge-yellow. Back, scapulars, and rump dull brownish olive-green; wings and tail dull brownish, scarcely edged with paler, except in young. *Hab.*—Guiana (Cayenne and Demerara) ..... T. LUGGERI.

C. Mouse-gray beneath.

13. Tail very slightly emarginated. Extreme end of outer primaries abruptly attenuated. Wing, 3.50–4.00; tail, 3.10–3.30; bill, from nostril, .40, breadth .30, depth .20; tarsus, .60; middle toe, .42. Pileum black, with a concealed central patch of gamboge-yellow. Above, dull smoky slate-color, the secondaries narrowly edged with whitish. Lower surface uniform mouse-gray. *Hab.*—Bolivia and Eastern Peru.

T. AURANTIO-ATROCRISTATUS.

1.—TYRANNUS MAGNIROSTRIS.

Tyrannus magnirostris, D'ORB., in La Sagra's Cuba, Ois., 1839, pl. 13 (Cuba).—BRYANT, Pr. Boston Soc. IX, 1866, 66 (Inagua, Bahamas).—SCL. & SALV., Nom. Neotr. 1873, 53 (Cuba).

Melittarchus magnirostris, CABAN., J. f. O. 1855, 477; Mus. Hein. II, 1859, 80.—GUNDL., Report, 1865, 238.

Tyrannus matutinus (part), VIEILL., Enc. Méth. 1823, 850.

"*Muscicapa dictator*, LICHT., in Mus. Berol." (Caban. & Heine).

SP. CH.—Wings, 5.25–5.30; tail, 4.00–4.25; bill, from nostril, 1.00–1.05, its depth .42–.46, width .60–.64; tarsus, .88; middle toe, .72. Tail slightly emarginated. Five outer primaries attenuated at the end by the abrupt emargination of the inner webs.

Above brownish-slate, becoming much darker (blackish sepia-brown or blackish slate) on the head, the wing-coverts and secondaries broadly bordered with grayish white, the rectrices and wing-coverts tipped with the same; primaries and rectrices brownish dusky, narrowly and indistinctly edged with grayish; concealed crown-patch bright orange-red (the feathers tipped with blackish), surrounded by white, the latter entirely concealed. Lower surface entirely white, the sides and breast washed with a faint (scarcely perceptible) ash-gray shade, the lining of the wings tinged with sulphur-yellow.

The following specimens, in the collection of the National Museum, have been examined:—

34237	♂ ad.	Remedios, Cuba..	Dec., 1873	N. H. Bishop.
.....	— ad.	Bahamas	.....	Dr. H. Bryant.
55447½	♂ ad.	Cuba	.....	Dr. J. Gundlach.

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2.—TYRANNUS ROSTRATUS.

Tyrannus rostratus, SCL., Ibis, Jan., 1864, 87 (Trinidad; Guiana).—TAYLOR, Ibis, 1864, 87 (Trinidad).—SCL. & SALV., P. Z. S. 1864, 361 (Isth. Panama ?); Nom. Neotr. 1873, 53.—SEMPER, P. Z. S. 1871, 272 (Sta. Lucia, W. I.); 1872, 651 (do.—"Pipperie").—LAWR., Proc. U. S. Nat. Mus. I, 1878, 60 (Dominica), 191 (St. Vincent, common), 234 (Antigua, extremely abundant), 240 (Barbuda, common).

"*Tyrannus magnirostris*," SCL., Catal. 1861, 263, No. 1449 (nec D'Orb.).

SP. CH.—Wings, 4.70–4.75; tail, 3.85–4.20; bill, from nostril, .92–.95 depth at base .34–.40, width .58–.60; tarsus, .70; middle toe, .58–.62 *Adult:* Above uniform clear plumbeous, the auriculars darker (nearly black); feathers of the pileum with blackish shaft-streaks, and pure white at the base; a concealed patch of bright orange-red. Wings and tail blackish slate, the larger wing-coverts and secondaries edged with whitish gray; rectrices faintly paler along edges and at extreme tips. Lower parts white, shaded across the breast with pale ash-gray, the sides of the breast strongly of this color; lining of the wing white, the axillars (in some specimens) tinged with sulphur-yellow.

HAB.—Northern coast of South America and the Lesser Antilles.

REMARKS.—This bird so closely resembles *T. dominicensis* in color and form as to suggest the probability of its being a local race of that species. It is proper to state, however, that I have never seen an intermediate specimen, though many of both species have been examined, and the slight difference in coloration (noted under the head of *T. dominicensis* and in the synoptical table), as well as the quite marked difference in size, may be found entirely constant.

3.—TYRANNUS DOMINICENSIS.

Tyrannus dominicensis, BRISS., Orn. II, 1760, 394, pl. 38, fig. 2.—RICH., List, 1837,—.—GOSSE, Birds Jam. 1847, 169.—BAIRD, B. N. Am. 1858, 172 (coast S. Carolina; Florida Keys; West Indies); Cat. N. Am. B. 1859, No. 125.—NEWTON, Ibis, 1859, 146 (St. Croix, W. I.; biogr.).—CASS., Pr. Ac. Nat. Sci. Phil. 1860, 143 (Cartagena, New Granada).—BRYANT, Pr. Boston Soc. 1866, 248 (Porto Rico).—B. B. & R., Hist. N. Am. B. II, 1874, 315, 319, pl. 43, fig. 8 (Cuba, Jamaica, St. Thomas, Santa Cruz, Sombrero, and St. Batholomew, W. I.; Cartagena, New Granada; Greytown, Nicaragua; Florida Keys; coast of S. Carolina; accidental in Massachusetts).—ALLEN, Bull. Mus. Comp. Zool. II, No. 3, 1871, 300 (St. Augustine, Florida; May, several).

Lanius tyrannus, var. *β. dominicensis*, GMEL., S. N. I, 1788, 203 (ex Buff. Pl. Enl. 537).

Melittarchus dominicensis, CABAN., J. f. O. 1855, 478 (Cuba); Mus. Hein. II, 1859, 80, footnote (Hayti and Cuba).

Muscicapa dominicensis, AUD., Orn. Biog. II, 1834, 392, pl. 46; Birds Am. I, 1840, 201, pl. 55.

Tyrannulus dominicensis, JARD., Contr. Orn. 1850, 67 (Bermudas).

Tyran titiri, BUFF., Pl. Enl. 537.

Tyrannus griseus, VIEILL., Ois. Am. Sept. I, 1807, 76, pl. 46.—SWAINS., Quart. Jour. Sci. XX, 1826, 276.—GRAY, Gen. I, 1844, 247.—BONAP., Consp. I, 1850, 192.—SCL., Catal. 1861, 236, No. 1450 (Jamaica).—MARCH, P. A. N. S. 1863, 287 (do.)—

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TAYLOR, Ibis, 1864, 169 (Porto Rico).—LAWR., Ann. Lyc. N. Y. VIII, 1864, 99 (Sombrero); 1865, 183 (Greytown, Nicaragua).—BRYANT, Pr. Boston Soc. 1866, 90 (St. Domingo).

Tyrannus matutinus (part), VIEILL., Enc. Méth. 1823, 850.—D'ORB, in La Sagra's Cuba, Ois. 1839, pl. 14.— GRAY, Gen. I, 1844, 247.

Tyrannus tiriri, TEMM., Tabl. Méth. 1836, 24.

Gray Kingbird, BAIRD, l. c., et Auct.

SP. CH.—Wing, 4.45–4.80; tail, 3.50–4.05; bill, from nostril, .75–.82, depth at base .30–.36, width .47–.55; tarsus, .70–.75; middle toe, .52–.60. *Adult:* Similar to *T. rostratus*, but lighter plumbeous above, and the lining of the wing decidedly yellow. *Young:* No colored patch on the crown; smaller wing-coverts, upper tail-coverts, and rectrices distinctly bordered with pale rusty; lining of wing deep sulphur-yellow, and crissum strongly tinged with the same.

HAB.—West Indies and adjacent coasts of the continent from Florida to New Granada. Accidental as far north along the Atlantic coast of the United States as Massachusetts.

REMARKS.—The specimens in the National Museum Collection represent very nearly the known distribution of the species. Specimens from Greytown, Nicaragua (40438, H. E. Holland), and from Cartagena, New Grenada (17885, A. Schott), are quite indistinguishable from Antillean examples.

4.—TYRANNUS CAROLINENSIS.

Muscicapa corona rubra, CATESB., Carol. I, 1731–'48, 55, pl. 55.

Tyrannus, BRISS., Orn. II, 1760, 391.

Lanius tyrannus, LINN., S. N. I, 1758, No. 4; ed. 12, I, 1766, 136 (ex Catesby, l. c.).—LATH., Ind. Orn. I, 1790, 81.

Muscicapa tyrannus, WILS., Am. Orn. I, 1808, 66, pl. 13, fig. 1.—BONAP., Synop. 1828, 66.—NUTT., Man. I, 1832, 265.—AUD., Orn. Biog. I, 1840, 453; V, 1842, 420, pl. 79; Synop. 1839, 40; B. Am. I, 1827–'30, 204, pl. 56.—GIRAUD, B. Long I. I, 1844, 39.

Gobe-mouche de la Caroline, BUFF., Pl. Enl. 676.

Lanius tyrannus, var. γ. *carolinensis*, GMEL., S. N. I, 1788, 302 (ex Pl. Enl. 676).

Tyrannus carolinensis, TEMM., Tabl. Méth. 1836, 24.—BAIRD, B. N. Am. 1858, 171; Cat. N. Am. B. 1859, No. 124.—CABAN. & HEINE, Mus. Hein. II, 1859, 79.—COOP & SUCKL., Pacific R. R. Rep. XII, ii, 1860, 167 (Washington Terr.).—HAYDEN, Rep. 1862, 157.—BLAKIST., Ibis, 1862, 3 (Forks Saskatchewan and Saskatchewan Plains; breeds).—LORD, Pr. Roy. Art. Inst. 1864, 113 (Brit. Columbia).—LAWR., Ann. Lyc. N. Y. VIII, 1865, 183 (Greytown, Nicaragua); Bull. U. S. Nat. Mus. No. 4, 1876, 28 (Japana, Isth. Tehuantepec; May).—COOPER, Orn. Cal. I, 1870, 311 (Western records; not in Calif. !).—STEPHENSON, Rep. U. S. Geol. Surv. Terr. 1870, 463 (Colorado).—MERRIAM, ib. 1872, 689.—HOLDEN & AIKEN, Pr. Boston Soc. 1872, 205 (Colorado and Wyoming).—ALLEN, Bull. Mus. Comp. Zool. III, 1872, 179 (Utah and Wyoming).—COUES, Key, 1872, 169; Check List, 1873, No. 242; Birds N. W. 1874, 235.—RIDGW., Pr. Essex Inst. Nov. 1873, 184 (Colorado); ib. Jan. 1875, 17 (Truckee R., W. Nevada), 30 (Salt Lake City, Utah), 33 (Parley's Park, Utah); Field and Forest, June, 1877, 208 (Colorado).—GENTRY, Pr. Phila. Ac. 1874, 103 (habits).—B. B. & R., Hist. N. Am. B. II, 1874, 316, pl. 43, fig. 4.

Muscicapa rex, BARTRAM, Fragments N. H. Penn. 1799, 18.

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Tyrannus pipiri, VIEILL., Ois. Am. Sept. I, 1807, 73, pl. 44.—CABAN., J. f. O. 1855, 478 (Cuba).—SCL., Catal. 1862, 236, No. 1451.—GUNDL., Repert. 1865, 239 (Cuba).—SCL. & SALV., P. Z. S. 1866, 189 (Nauta, R. Ucayali, E. Peru! *); 1870, 837 (coast Honduras); Nom. Neotr. 1873, 53 ("Am. centr. et merid. ad Boliviam").—COUES, Proc. Phila. Acad. 1871, 26.

Tyrannus intrepidus, VIEILL., Enc. Méth. III, 1823, 849; Gal. Ois. I, 1824, 214, pl. 133.—SWAINS., Philos. Mag. I, 1827, 368; Quart. Jour. XX, 1826, 274.—SW. & RICH., F. B. A. II, 1831, 137.—BONAP., Comp. List, 1838, 24.—WOODH., Sitgr. Rep. 1853, 73.—SCL., P. Z. S. 1857, 232; 1858. 302 (Oaxaca); 1859, 383 (Oaxaca; March, February), 439 ("whole of Mexico").—SCL. & SALV., Ibis, 1859, 120 (Guatemala).—MOORE, ib. 55 (Honduras).—SUMICHR., Mem. Bost. Soc. I, 1869, 557 (Vera Cruz).

Myiarchus intrepidus, BURM., Verz. Mus. Hal. p. 46.

Muscicapa animosa, LICHT., Verz. Doubl. 1823, 54.

Tyrannus leucogaster, STEPHENS, Gen. Zool. XIII, ii, 1826, 132.

Tyrannus vieillotii, SWAINS., F. B. A. II, 1831, 138 (based on Vieill., Gal. Ois. pl. 133).

King Bird; Bee Bird; Bee Martin, VULG.

SP. CH.—Wing, 4.45–4.75; tail, 3.40–3.75; bill, from nostril, .50–.57, depth at base .24–.27, width .37–.40; tarsus, .70–.78; middle toe, .55–.60. *Adult:* Above black, becoming plumbeous on the back, scapulars, and rump; large wing-coverts and remiges edged with whitish; upper tail-coverts bordered with white, and tail broadly tipped with the same. Below pure white, strongly shaded with ash-gray across the jugulum. Middle of the crown with a concealed patch of bright orange-red. *Young:* Above dusky brownish slate, the wing-coverts bordered with pale fulvous, the remiges with dull whitish; upper tail-coverts bordered with pale rusty; tail tipped with pale fulvous, or brownish white. Beneath as in the adult, but jugulum tinged with pale fulvous. No colored patch on vertex.

HAB.—Temperate North America, except parts of the Pacific and Middle Provinces; Middle America, and Western South America to Bolivia; Cuba and Bahamas.

REMARKS.—No difference is perceptible, either in color or proportions, between specimens from Tropical America and those from the United States, although the former may, perhaps, average a trifle smaller. Western examples are likewise identical with Eastern. The species breeds at least as far south as the Isthmus of Panama, as is evident from young specimens, in first plumage, in the National Collection, from the line of the Panama Railroad.

5.—TYRANNUS CRASSIROSTRIS.

Tyrannus crassirostris, SWAINS., Quart. Journ. Sci. XX, 1826, 278; Philos. Mag. 1827, 368.—SCL., Ibis, 1859, 439 (Mazatlan); Catal. 1861, 236, No. 1448 (Mazatlan, W. Mexico).—SCL. & SALV., Ibis, 1860, 399 (Escuintla).—LAWR., Bull. U. S. Nat. Mus. No. 4, 1876, 28 (Chihuitan, Tehuantepec, and Los Cues, Oaxaca).

* "Indistinguishable from North American specimens." Said to have been seen by D'Orbigny as far South as Sta. Cruz de la Sierra, Bolivia!

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Melittarchus crassirostris, CABAN., J. f. O. 1855, 478.—CABAN. & HEINE, Mus. Hein. II, 1859, 80, footnote (Mexico).

Megarhynchus crassirostris, FINSCH, Abh. Nat. Brem. 1870, 329 (Mazatlan).

"*Muscicapa gnatho*, LICHT., in Mus. Berol." (Caban. and Heine).

SP. CH.—Length, about 9.50; extent, 15.50; wing, 5.00–5.50; tail, 4.00–4.50; bill, from nostril, .75–.81, depth at base .38–.43, width .53–.60. Tail even, or very slightly emarginated; two to three outer primaries slightly narrowed at ends, and the edge of the inner web faintly sinuated near the middle. *Adult:* Above, olivaceous-gray, the head darker, approaching sepia-brown, especially on the auriculars; wings and tail darker and more brownish than the back, all the feathers faintly edged with pale brownish. Malar region, chin, and throat pure white; jugulum pale ash-gray, tinged with light yellowish olive laterally and posteriorly; rest of lower parts, including lining of wing, clear, rather pale sulphur-yellow. Crown with a concealed patch of clear lemon-yellow. Bill brownish black; feet deep black; iris brown. *Young:* Head pale ash-gray, tinged with light brown, the lores and auriculars darker; no colored patch on crown; back similar to the head, but tinged with olive-green; wing-feathers distinctly bordered with yellowish white (tinged with pale rusty on the coverts); tail-feathers edged with pale yellowish fulvous, becoming more rusty around the terminal border of the feathers. Lower parts as in the adult, but the abdomen, etc., mixed with patches (new feathers) of bright lemon- or gamboge-yellow.

HAB.—Mexico, including both coasts; north to Orizaba and Mazatlan.

REMARKS.—This very strongly marked species is decidedly the most robust member of the genus, although considerably inferior to *T. magnirostris* in general bulk. The bill is peculiarly stout, being almost as deep as it is wide through the base, all its outlines being more decidedly convex than in any other species.

Following is a list of specimens examined, with measurements:

29401	United States.	♂ ad.	Colima	Jan. —, 1863	5. 50	4. 50	.78	.60	.38	.78	.68
52807	....do	♀ ad.	Mazatlan		5. 25	4. 00	.78	.54	.40	.72	.65
57621	...do	♀ ad.	Tehuantepec	Dec. 1, 1868	5. 00	4. 20	.75	.57	.40	.72	....
57628	....do	— ad.	....do	Nov. 24, 1868	5. 00	4. 10	.81	.60	.43	.78	.65
60066	.. do	♀ ad.			5. 20	4.10	....	.58	.....	.75	.63
52806	....do	♂ ad.	Mazatlan		5. 45	4. 35	.80	.53	.43	.75	.65
.....	B. S	♂ juv.	Orizaba	July 13, 1866	.....	.....	....	....	.....	.....	....

6.—TYRANNUS MELANCHOLICUS.

a. melancholicus.

Suiriri guazu, AZARA, Apunt. II, 1805, 152, No. 198.

Tyrannus melancholicus, VIEILL., Nouv. Dict. XXXV, 1819, 48 (ex Azara, l. c.); Enc. Méth. II, 1823, 851.—D'ORB. & LAFR., Mag. de Zool. 1837, 44.—D'ORB., Voy. Ois. 1839, 311.—BURM., Th. Bras. II, 1856, 464; Reis. La Plata, II, 1861, 452.—BAIRD, B. N. Am. 1858, 176 (part—not descr.).—SCL., Catal. 1862, 235, No. 1443 (Brazil).—SCL. & SALV., P. Z. S. 1868, 142 (Buenos Ayres); Nom. Neotr. 1873, 53 (part).—EULER, J. f. O. 1867, 227 (Brazil; descr. nesting, etc.).—PELZ., Orn. Bras. 1871, 117 (S. Brazil; numerous localities).

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Laphyctes melancholicus, CABAN. & HEINE, Mus. Heine. II, 1859, 76 (Brazil; excl. syn. *albogularis*, Burm.).

Muscicapa despotes, LICHT., Verz. Doubl. 1823, 55.

Muscicapa furcata, SPIX, Av. Bras. II, 1825, 15, pl. 19.

Tyrannus furcatus, MAX., Beitr. III, 1831, 884.

Tyrannus crudelis, SWAINS., Quart. Jour. XX, 1826, 275 (Brazil).

β. couchi.

Tyrannus couchi, BAIRD, B. N. Am. 1858, 175 ("Northeastern Mexico to Rio Grande"); ed. 1860, pl. 49, fig. 1; Cat. N. Am. B. 1859, No. 128.—SCL., Ibis, 1859, 439 (Orizaba); Catal. 1862, 235, No. 1445 (Mexico).—DRESSER, Ibis, 1865, 472 (common near Matamoras and Brownsville).

Tyrannus melancholicus var. *couchi*, B. B. & R., Hist. N. Am. B. II, 1874, 329, pl. 43, fig. 7.

Tyrannus melancholicus couchi, COUES & SENNETT, Bull. U. S. Geol. & Geog. Surv. Terr. IV, No. 1, 1878, 31 (Hidalgo, Texas; common).

"*Tyrannus melancholicus*," SCL. & SALV., Ibis, 1859, 121 (Dueñas, Guatemala; descr. eggs); (?) P. Z. S. 1870, 837 (coast Honduras); Nom. Neotr. 1873, 53 (part).—TAYLOR, Ibis, 1860, 113 (Honduras).—OWEN, Ibis, 1861, 63 (San Geronimo, Guat.; descr. nest).—LAWR., Ann. Lyc. N. Y. IX, 1869, 204 (Yucatan).—SCL., P. Z. S. 1870, 439 (Cordova, Jalapa, and Oaxaca, Mexico; Guatemala).

"*Tyrannus satrapa*" (part), SCL., Catal. 1862, 235, No. 1444 (specs. ex Vera Paz and Orizaba).

Couch's Flycatcher, BAIRD, l. c.

γ. satrapa.

"*Tyrannus melancholicus*," TSCHUDI, Wiegm. Archiv, 1844, 12 (?); Faun. Per. Aves, 1844–46, 131 (?).—CABAN,, in Schomb. Guiana, III, 1848, 700.—SCL., P. Z. S. 1855, 150 (Bogota); 1856, 141 (David, Chiriqui); 1858, 70, 457; 1859, 55; 1860, 92 (E. Ecuador); 281 (Babahoyo, Ecuador); 1867, 342 (Lima, Peru),—BAIRD, B. N. Am. 1858, 176 (part; specs. described from "Vera Cruz" and Panama).—SCL. & SALV., P. Z. S. 1864, 360 (Isth. Panama); 1867, 279 (Mosquito coast), 578 (Para), 751 (Huallaga R., E. Peru); 1869, 189 (Nauta, Peru), 598, (Conispata, Peru); Nom. Neotr. 1873, 53 (part).—CASS., Pr. Philad. Ac. 1860, 143, (New Granada).—LAWR., Ann. Lyc. N. Y. VII, 1861, 295 (Panama); IX, 1869, 237 (Puna I., W. Ecuador).—TAYLOR, Ibis, 1864, 87 (Trinidad; Venezuela).—SALVIN, P. Z. S. 1870, 199 (Veragua).—FINSCH, ib. 572 (Trinidad).—WYATT, Ibis, 1871, 334 (New Granada, up to 7,000 feet; iris brown).

Laphyctes satrapa, CABAN. & HEINE, Mus. Hein. II, Oct. 15, 1859, 77 (Guiana; Caracas; ex "*Muscicapa satrapa*, Licht., in Mus. Berol.").—CABAN., J. f. O. 1861, 251.

Tyrannus satrapa, SCL., Catal. 1862, 235, No. 1444 (part; specs. ex Tobago and Sta. Marta and Bogota, New Granada).—SCL. & SALV., P. Z. S. 1864, 360 (Isth. Panama).

"*Tyrannus verticalis*," LÉOT., Ois. Trinidad, 1866, 213 (nec Say).

SP. CH.—Tail more or less decidedly emarginate (depth of the fork .20–.85 of an inch); five outer primaries more or less narrowed at the ends by the emargination of the inner web (nearly obsolete in some females and in the young). Wing, 4.25–4.85; tail, 3.70–4.50; bill, from nostril, .60–.77, width .40–.52, depth .24–.35; tarsus, .60–.80; middle toe, .50–.60.* Head cinereous, the auriculars perceptibly darker, the malar region, chin, and throat paler (whitish in more northern specimens). Back, scapulars, and sides of the breast greenish cinereous, the green

*Forty-eight *adults* measured!

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tinge more decided on the breast from the invasion of the yellow of the abdomen. Wings and tail dusky, with lighter edgings. Lower parts (posterior to the breast) rich lemon-yellow. Bill and feet black. *Adult:* Crown with a central concealed patch of bright orange-red; wing-edgings light cinereous, sometimes (more especially in northern examples) tinged with pale yellow. *Female* smaller than the male, the colored patch on the crown more restricted, the tail less deeply emarginate, the primaries less conspicuously narrowed at ends. *Young:* Crown without colored central patch; wing-edgings pale rusty on all the coverts; upper tail-coverts and rectrices likewise bordered with rusty.

HAB.—The entire Neotropical Region, excepting the West Indian islands; north to Texas (Lower Rio Grande Valley) and Mazatlan; south to Buenos Ayres and Peru.

REMARKS.—In all examples of this species from the South Brazilian Region (embracing, besides Southern Brazil, Paraguay, Bolivia, and Buenos Ayres), the colors are considerably darker than in any from more northern localities, the throat being decidedly cinereous, and the back a quite dark olivaceous gray. This series also averages considerably larger in size, and has the tail more deeply forked. Specimens from northern South America (Amazonian and Columbian districts) show decidedly lighter throats, but are otherwise scarcely different, except in their usually smaller size. To the northward, the tendency to gradually lighter colors increases in direct ratio with the latitude, culminating with the northern limit to the range of the species, in Northern Mexico and the Rio Grande Valley of Texas. Taking examples from the latter region, and comparing them with those from the extreme southern range of the species (Buenos Ayres and contiguous provinces), the difference is quite obvious, although still not conspicuous, even on comparison; but the points given by Professor Baird, in "Birds of North America," for distinguishing his *T. couchi* (the northern form) from true *melancholicus*, are found to hold good. The ample series at hand, however, embracing more than fifty specimens, from every part of the known range of the species, proves beyond question the gradual transition between the extremes, in intermediate localities.

The specimens from northern South America having been named *satrapa* by Cabanis and Heine (Mus. Hein. II, p. 77), this name may be used to characterize an intermediate form showing a tendency in a nearly equal degree toward the distinctive character of both *melancholicus* and *couchi*. It may be observed that while examples of *satrapa* agree best with the northern form in the whiteness of the throat, and with the southern one in the dark shade of the wings and tail, they are, as a rule, much brighter yellow beneath than either. Costa Rican specimens agree more nearly with true *satrapa* than with Mexican examples (*couchi*).

A rather more than ordinary amount of individual variation in this species is shown by the very careful measurements of a large series.

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This variation extends to all parts of the external anatomy, and is by no means equally correlated, as specimens having the wing or tail of average length, or even unusually lengthened, may have the bill or the tarsus unusually small, and *vice versa*. The tarsus, in forty-eight specimens, varies from .60 to .80 of an inch,—a variation amounting to nearly one-third of the mean length. The bifurcation of the end of the tail varies even more remarkably, the depth of the fork ranging from .20 to .85 of an inch in specimens having the feathers of this member fully developed and otherwise normal!

In the series under examination there are a few specimens more or less noticeable on account of deviations from the usual coloration in one respect or another. No. 16710, from the Amazon (Lieut. Herndon), has the crown-patch clear yellow instead of orange-red, while the wings are almost devoid of the usual light edgings. The plumage, however, of this specimen is much abraded. Specimen No. 39900, from the headwaters of the Huallaga River, Eastern Peru (W. S. Church), is one of the darkest in the entire series. It agrees almost exactly in colors with No. 55701 from Conchitas, Buenos Ayres; but the sides of the breast are dark greenish slate, quite as dark as the color of the back, in very marked contrast to the much paler yellowish olive of the central portion of the breast. No. 37956, from Merida, Yucatan, an adult male, has the orange-red crown-patch surrounded by a strong suffusion of olive green, like the color of the back. A very highly colored specimen from Costa Rica (No. 33392, J. Carmiol) has the two longer lower tail-coverts chiefly dusky, with wide borders of pale yellow.

Autumnal specimens of *couchi* have the conspicuous paler edgings to the wing-feathers strongly suffused with sulphur-yellow, and the back more decidedly green than in summer examples. The single young example of this Northern race (No. 58849, ♂, Tehuantepec, June, 1869; Prof. Sumichrast) differs conspicuously from four individuals of the same age from Bahia, and one from Costa Rica (the latter being exactly like the former), in the borders of the wing-coverts being pale sulphur-yellowish instead of light cinnamon-rusty, and in the more creamy yellow of the lower parts. It is perhaps doubtful, however, whether other examples from Mexico would not agree more closely with Southern ones.

The dimensions vary in this species not only with the individual, but also to a very considerable extent with the locality. Thus, dividing the large series before me into groups representing the several zoo-geographical provinces into which Tropical America is divisible, and taking the average of the several measurements of each, the following is found to be the result:

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Zoo-geographical province.	No. of specimens.	Wing.	Tail.	Bill from nostril.	Width of bill at base.	Depth of bill at base.	Tarsus.	Middle toe.	Fork of tail.
Brazilian	7	4.61	4.09	.71	.47	.30	.72	.55	.69
Amazonian (including Guiana)	5	4.48	3.97	.67	.45	.31	.65	.53	.61
Columbian (including Western Ecuador)	14	4.47	4.03	.68	.46	.28	.69	.53	.61
Central American	6	4.67	4.08	.65	.45	.29	.72	.54	.56
Mexican (including Guatemala and Honduras)	15	4.60	4.04	.68	.43	.31	.73	.57	.42

The result would of course be somewhat changed with a different proportion of specimens representing the several regions; but in any case it would probably be shown, that the general dimensions increase in proportion to the distance of the locality from the equator, and that the tail is most deeply emarginated in the most southern examples, becoming gradually less forked toward the northward.

7.—TYRANNUS ALBIGULARIS.

Tyrannus albogularis, BURM., Th. Bras. II, 1856, 465 (northern forest-district of Brazil).—PELZ., Orn. Bras. 1871, 117 (Goiaz, Cuyaba, Matogrosso, and S. Vicente).

Tyrannus albigularis, FINSCH, P. Z. S. 1870, 572, in text sub *T. melancholicus* (critical).—SCL. & SALV., Nom. Neotr. 1873, 53.

"*Muscicapa albigula*, NATTERER, Catal. Msc." (*Pelzeln*).

SP. CH.—"Head gray; middle of the crown fire-red; back green; throat white; breast and belly yellow; wings and tail more brownish, the feathers with lighter edges.

"A little smaller than the preceding species [*T. melancholicus*], more slender and of more graceful form, the beak especially. Crown, as far as the eye, and nape light whitish gray, rictal region ("Zügelgegend") and upper half of the ear-coverts blackish, the cheeks and the lower half of the ear-coverts as well as the throat, pure white. Back and lesser wing-coverts ("Achselfedern") olive-green, the upper tail-coverts brownish. Wings and tail-feathers grayish brown, the first narrowly edged with whitish green, the latter with rust-yellow, particularly towards the base; the inner edge of the wing of the same color, but broader, wanting on the tail-feathers. Only the three first primaries attenuated and emarginated, but the tip ("Absatz") much shorter and blunter [than in *T. melancholicus*]. Breast, belly, thighs and anal region lemon-yellow; there is no gray shade on the breast, but the yellow color with greenish tint extends here as far as the neck. Beak and legs blackish brown, iris brown; the beak on the whole smaller, considerably shorter, with a distinct though blunt ridge and moderately convex; . . . . the toes longer.

"Total length 8″, culmen 7‴, wings 4″, tail in the middle 3″, along the outer feather 3″ 4‴, commissure 8‴, middle toe without claw 6‴.

"The species inhabits the northern forest-region of Brazil, near Bahia, and Pernambucco; it entirely resembles the preceding in its habits and

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also much in its appearance, so much that it certainly has been confounded with it by most authors."

REMARKS.—Never having seen a specimen referable to this species, I follow Messrs. Sclater and Salvin in recognizing it as distinct from *T. melancholicus*, without knowing, however, their grounds for doing so. In his remarks upon *T. melancholicus*, in the "Proceedings" of the Zoological Society of London for 1870, p. 572, Dr. Finsch alludes to *T. albigularis*, as follows:

"In contradiction to the views of Dr. Cabanis, I agree with von Pelzeln in considering *T. albigularis*, Burm. (Bras. ii, p. 465), to be specifically distinct from *T. melancholicus*. A specimen from Brazil in the Bremen Museum shows the chin and throat decidedly white; whereas these parts in *T. melancholicus* are whitish gray. Four specimens from Northern Brazil (Ceará) all show this latter character."

Unfortunately, the other distinctive characters of Burmeister's species are not alluded to. That mentioned by Dr. Finsch, *i. e.*, the whiteness of the throat, seems of little account, since, according to the specimens which I have seen from that region, it is customary for *T. melancholicus* from northern South America to have the throat nearly, if not quite, white. The only characters given in Burmeister's description which appear really distinctive are the smaller size and the whitish green instead of pale grayish edgings to the wing-feathers. It is, therefore, solely upon the presumption that Messrs. Sclater and Salvin and Dr. Finsch have good reason for considering the species distinct from *melancholicus* that I so here consider it.

8.—TYRANNUS APOLITES.

Laphyctes apolites, CABAN. & HEINE, Mus. Hein. II, Oct. 15, 1859, 77 (*hab. incog.*).

SP. CH.—"Supra plumis dorsalibus fuscis, late olivascente-griseo-limbatis, itaque dorso quasi obsolete maculato; capite cinereo, pilei plumis basi splendide luteis, apice nigris, loris striaque postoculari nigrescentibus; alis caudaque fuscis, remigibus primariis minime, secundariis tectricibusque alaribus alboscente-, rectricibus extus anguste rufescente-marginatis, tectricibus caudæ superioribus fuscis latius rufescente-limbatis; subtus gula cinerascente, pectore abdomineque sulphurescentibus, illo densissime cinerascente adsperso; rostro nigro; pedibus fuscis.—Long. tot. 7″ 6‴, al. 4″, caud. 3″ 8‴, rostr. culm. 8‴, tars. 7‴, dig. med. exc. ung. 6‴."

REMARKS.—Although this supposed species is not recognized by Messrs. Sclater and Salvin in their *Nomenclator Avium Neotropicalium*, it would seem from the description above quoted, and the remarks which follow (of which a literal translation is given), to be very distinct from any other species of the genus. The black encirclement of the yolk-yellow crown, the spotted back, and several other characters mentioned, certainly cannot be reconciled in any other known species.

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"A quite typical *Laphyctes*, with strongly forked tail and the characteristic tapering to the points of the five outer primaries; smaller than *L. melancholicus* and *L. satrapa*, hence the smallest known species of the genus. Distinguished by the weaker and shorter beak, the dark encirclement of the vivid yolk-yellow crown, the darker back, appearing peculiarly spotted, and the lighter sulphur-yellow color of the under parts. Unfortunately, the only specimen which has reached us is without any indication of its habitat."

9.—TYRANNUS NIVEIGULARIS.

Tyrannus niveigularis, SCL., P. Z. S. May 22, 1860, 281 (Babahoyo, Ecuador; Mus. P. L. S.—"Irides hazel; bill, legs, and feet black"); Catal. 1861, 237, No. 1452 (Babahoyo).

SP. CH.—"*Supra cinereus, dorso olivaceo perfuso, capitis crista interne flava; loris et regione auriculari nigricante-cinereis: alis nigris, primariis stricte, secundariis et tectricibus late albido limbatis: cauda nigra unicolore, rectricum apicibus et parum externarum marginibus externis vix albicantibus: caudæ tectricibus superioribus nigris, olivaceo terminatis: subtus pallide flavus, gutture et collo antico pure albis, hujus lateribus et pectore summo cinereo vix lavatis: rostro et pedibus nigris.*

"Long. tota 7.0, alæ 4.1, caudæ 3.1.

"*Hab.* In rep. Equator.

"Mus. P. L. S.

"One ex. "Irides hazel: bill and legs black."

"A species of true *Tyrannus*, looking to its general structure and acuminated primaries, distinguishable by its small size, pure white throat and neck, and black tail. The primaries of the single specimen are not fully developed; but the three first are somewhat obtusely acuminated, quite as much as in *T. melancholicus*."

REMARKS.—From the description above quoted, this species would appear to resemble somewhat the *T. verticalis* of North America; but whether such are its real affinities, its describer does not explain. The description does not state whether the tail is even, emarginated, or rounded,—quite an important question in this connection.

10.—TYRANNUS VERTICALIS.

Tyrannus verticalis, SAY, Long's Exp. II, 1823, 60.—NUTT., Man. II, 1840, 360.—BONAP., Comp. List, 1838, 35; Consp. I, 1850, 192.—BAIRD, B. N. Am. 1858, 173; Cat. N. Am. B. 1859, No. 126.—HEERM., Pacific R. R. Rep. X, 1859, vi, 37.—COOP. & SUCKL., ib. XII, ii, 1860, 168.—SCL., Catal. 1862, 235, No. 1447.—HAYDEN, Rep. 1862, 157.—LORD, Pr. Roy. Art. Inst. IV, 1864, 113 (Brit. Columbia).—BRYANT, Pr. Boston Soc. X, 1865, 96 (Plympton, Maine).—COUES, Pr. Philad. Acad. 1866, 59 (Arizona); Key, 1872, 170; Check List, 1873, No. 244; B. N. W. 1874, 236.—COOPER, Orn. Cal. I, 1870, 312.—STEVENSON, Rep. U. S. Geol. Surv. Terr. 1870, 463 (Colorado).—MERRIAM, ib. 1872,

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690.—ALLEN, Bull. M. C. Z. 1872, 179 (Kansas, etc.).—AIKEN, Pr. Boston Soc. 1872, 205.—SCL. & SALV., Nom. Neotr. 1873, 53.—SNOW, B. Kans. 1873, 3 (abundant in E. Kansas!).—B. B. & R., Hist. N. Am. B. II, 1874, 324, pl. 43, fig. 2.—JOUY, Field and Forest, April, 1877, 178 (District Columbia; 1 spec.).—RIDGW., ib. June, 1877, 208 (Colorado).

Muscicapa verticalis, BONAP., Am. Orn. I, 1825, 18, pl. 2, fig. 2; Synop. 1828, 67.—NUTT., Man. I, 1832, 273.—AUD., Orn. Biog. IV, 1838, 422, pl. 359; Synop. 1839, 39; B. Am. I, 1840, 199, pl. 54.

Laphyctes verticalis, CABAN. & HEINE, Mus. Hein. II, 1859, 77, footnote.

SP. CH.—Wing, 4.75–5.25; tail, 3.65–4.00; bill, from nostril, .50–.55, depth at base .25–.28, width .35–.38; tarsus, .68–.77; middle toe .55–.58. *Adult:* Head, neck, and back bluish ash-gray, paler beneath, the chin and upper part of the throat being nearly white; lores and auriculars darker; back and breast tinged with olive-green, lighter beneath. Wings dusky, the feathers edged with slate-gray, these edgings broader and lighter on the secondaries. Upper tail-coverts and tail deep black, the outer webs of the lateral pair of rectrices yellowish white, in sharp contrast. Lower parts, posterior to the breast, deep sulphur-yellow, paler on the crissum; the lining of the wing strongly tinged with olive-gray. Crown with a concealed patch of bright orange-red or vermilion. *Young:* Head above and back light brownish-gray, the latter strongly tinged with olive-green; superciliary region paler than the crown, in quite marked contrast with the dusky-gray auriculars and lores. Chin, throat, and malar region white, gradually passing into pale brownish gray on the jugulum, the breast similar, but tinged with pale olivaceous; remaining lower parts pale creamy sulphur-yellow. Tail as in the adult; wings dusky, as in the adult, but the feathers widely edged with pale yellowish gray. No colored patch on the crown.

HAB.—The Western Province of North America, straggling occasionally entirely across the Eastern Province; Western Mexico, south to Isthmus of Tehuantepec* and Colima.†

11.—TYRANNUS VOCIFERANS.

Tyrannus vociferans, SWAINS., Quart. Jour. XX, 1826, 273 (Mexico); Philos. Mag. I, 1827, 368.—BAIRD, B. N. Am. 1858, 174; Mex. Bound. Surv. II, 1859, pt. ii, 8, pl. 10; Cat. N. Am. B. 1859, No. 127.—SCL., P. Z. S. 1859, 383 (Oaxaca; Feb.); Ibis, 1859, 439 (Oaxaca; Guatemala); Catal. 1862, 235, No. 1446 (Los Nogales, Sonora); P. Z. S. 1864, 176 (City of Mexico).—SCL. & SALV., Ibis, 1859, 120 (Vera Paz, Guatemala); Nom. Neotr. 1873, 53 (Mexico and Guatemala).—COUES, Pr. Philad. Ac. 1866, 59 (Arizona); Key, 1872, 170; Check List, 1873, No. 245; B. N. W. 1874, 238.—COOPER, Orn. Cal. I, 1870, 314 (Southern Cal.; breeding north to Sta. Cruz; wintering north to Los Angeles).—AIKEN, Pr. Boston Soc. 1872, 205 (S. E. Wyoming).—MERRIAM, Rep. U. S. Geol. Surv. Terr. 1872, 690.—SUMICHR., Mem. Boston Soc. I, 1869, 557 (Vera Cruz).—B. B. & R., Hist. N. Am. B. II, 1874, 327, pl. 43, fig. 5.—RIDGW., Bull. Essex Inst. Nov. 1873, 184 (Colorado);

*58,850, ♀ ad., Japana, Tehuantepec, April 29, 1869; F. Sumichrast.

†35,054, ♂ ad., Plains of Colima, October, 1863; J. Xantus.

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Field and Forest, June, 1877, 208 (do.).—STREETS, Bull. U. S. Nat. Mus. No. 7, 1877, 12 (St. Tomas Bay, Pacific side, Lower California).

Laphyctes vociferans, CABAN. & HEINE, Mus. Hein. II, 1859, 77 (Mexico).

Tyrannus cassini, LAWR., Ann. Lyc. N. Y. June 3, 1850, 39, pl. 3, fig. 2 (Texas).

"*Muscicapa satelles*, LICHT., in Mus. Berol." (*Caban. & Heine*).

SP. CH.—Wing, 5.00–5.40; tail, 3.70–4.20; bill, from nostril, .55–.60, depth at base .27, width .35–.45; tarsus, .72–.78; middle toe, .55–.60. Tail even. *Adult:* Head and neck deep plumbeous, somewhat lighter beneath, where passing somewhat abruptly into white on the chin; back, scapulars, and breast grayish olive-green, lighter beneath; remaining lower parts sulphur-yellow, the crissum and lining of the wings paler. Wings light brownish gray, the feathers quite distinctly bordered with grayish white. Upper tail-coverts and tail black, the latter faintly tipped with light brownish gray, the outer web of the lateral pair of rectrices more or less widely edged with the same. Crown with a concealed patch of bright orange-red. Bill and feet black; iris brown. *Young:* Head, neck, back, and breast dull grayish slate, paler on the jugulum, the chin and upper part of the throat whitish, the back tinged with brown; lores and auriculars darker. Wing-coverts bordered with light fulvous or rusty buff. Abdomen, etc., pale creamy sulphur-yellow. No colored patch on the crown.

HAB.—Mexico and Guatemala, extending into the southern part of the Western Province of the United States; along the eastern base of the Rocky Mountains, north to about 41°; along the coast of California, to about 37°; south to Costa Rica.

REMARKS.—Many localities in Mexico (both coasts and interior), Guatemala, and Costa Rica, are represented by specimens in the collection of the National Museum.

12.—TYRANNUS LUGGERI.

Tyrannus luggeri, RIDGW. MS.

SP. CH.—Wing, 4.15–4.25; tail, 2.25–2.30; bill, from nostril, .52, width at base .40, depth, .28–.32; tarsus, .75–.80; middle toe, .65. Tail very slightly emarginate. Ends of primaries not at all attenuated! Above, greenish olive, the wings and tail dusky brownish, the head dark cinereous, with an indistinct grayish streak above the auriculars. Throat pure white, streaked with ash-gray laterally and across the jugulum. Sides of breast deep olivaceous; remaining lower parts, including lining of the wing, bright gamboge-yellow. Bill and feet blackish. *Adult:* Crown with a large concealed patch of bright gamboge-yellow. Wings and tail very faintly edged with lighter brown. *Young:* Crown-patch much restricted (nearly obsolete). All the wing-feathers (coverts and remiges) and rectrices distinctly bordered with light rusty.

HAB.—Guiana (Cayenne, Demerara. Mus. G. N. L. & R. R.).

REMARKS.—With a closer resemblance to *T. melancholicus* than to

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any other of the species of this genus with which I have been able to compare it, *Tyrannus luggeri* is, nevertheless, so very distinct as not to need any special comparison. In size and general form it corresponds almost exactly with *T. carolinensis*, while the bill is much more like that of the latter species in size and shape than that of any of the yellow-bellied group. The totally different coloration, however, allies it more closely to the group represented by *T. melancholicus*, while the broad-tipped primaries constitute a feature entirely unique in this genus.

Although it seems rather strange that a new species of this genus should be found in a district so well explored ornithologically as the habitat of the present bird, I have nevertheless been unable to find a description at all applicable to it.

13.—TYRANNUS AURANTIO-ATROCRISTATUS.

Tyrannus aurantio-atrocristatus, LAFR. & D'ORB., Mag. de Zool. 1837, 45 (Bolivia).—D'ORB., Voy. Ois. 1839, 312 (Corrientes, Paraguay; Valle Grande, Bolivia).—BURM., Reise La Plata, II, 1861, 453.—SCL. & SALV., P. Z. S. 1866, 190 (Ucayali, E. Peru); Nom. Neotr., 1873, 53.—HUDSON, P. Z. S. 1870, 113 (Buenos Ayres, rare; Entre Rios).

Tyrannus ynca, LICHT., Nomencl. 1854, 16 (Brazil; Guiana).

Tyrannus inca, SCL., P. Z. S. Nov. 26, 1861, 383 (Bolivia; Mus. P. L. S. et Berol.; ex "Licht. in Mus. Berol."); Catal. 1861, 237, No. 1453 (Bolivia).—PELZ., Orn. Bras. 1871, 118 (Goiaz, Rio Vermelho, Serrado, and Cuyaba).

? *Tyrannus auriflamma*, BURM., J. f. O. July, 1860, 246 (Mendoza).

SP. CH.—Wing, 3.50–4.00; tail, 3.10–3.30; bill, from nostril, .40, width at base .30, depth .20; tarsus, .60; middle toe, .42. Tail even, or (apparently) very slightly emarginated. Extreme end of outer primary attenuated.* Above dull smoky slate, the wings and tail with narrow paler edgings. Below mouse-gray, becoming paler and (in young at least) somewhat tinged with pale sulphur-yellow posteriorly. Bill and feet blackish. *Adult:* Entire pileum black, with a central concealed patch of clear lemon-yellow. *Young:* Pileum smoky brownish slate, like the back.

HAB.—Bolivia (Lafr. & D'Orb.); Paraguay (D'Orb.); Buenos Ayres (Hudson); Brazil (Pelzeln); Pebas, Peru (Mus. Vassar College).

REMARKS.—This very strongly marked species is so very different from the other *Tyranni* in both coloration and the details of external form as to suggest strong doubts of its being properly referable to this genus at all. It surely presents a very great contrast to *T. magnirostris*. There are, however, such variations of form among the spe-

*Dr. Sclater, in his description of *Tyrannus inca* (l. c.), says that "the external primaries are acuminated towards the points, the first three being also deeply emarginated 0·4 inch from their extremities." This is very different from the shape of the quills in the single specimen I have been able to examine (an immature female, belonging to the Museum of Vassar College), in which all the quills except the first are very broad at the ends, the first only being emarginated and attenuated at the tip. This discrepancy may, however, be owing to difference of sex or age.

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cies usually assigned to this genus, as here restricted, that a further subdivision would necessitate a considerable number of generic groups—almost one for every species—so that, upon the whole, it may be better to leave this species in the genus *Tyrannus*, and consider it as representing the opposite extreme of size and form from *T. magnirostris*.

The above diagnosis is drawn up partly from Dr. Sclater's description of the adult as cited, and in part from an immature female in the Museum of Vassar College, Poughkeepsie, N. Y., collected at Pebas, E. Peru, by the late Professor Orton.

II.—*Descriptions of New Races.*

1.—LICHENOPS PERSPICILLATUS, β. ANDINUS.

Lichenops perspicillatus, β. andinus, RIDGW. MS.

CH.—Similar to *L. perspicillatus* (*α. perspicillatus*), but having the white on the primaries restricted to that portion of the quills beyond the sinuation of the outer webs.—*Hab.* Western South America, from Chili to New Granada.

An examination of the series of *Lichenops* in the collection of the National Museum reveals a very marked and constant difference between specimens from Buenos Ayres, Brazil, and Paraguay on the one hand, and those from western South America on the other. In the former, of which there are nine adult males before me, representing the above-named localities, the white patch on the primaries extends anteriorly to the end of the primary-coverts, almost the whole extent of the outer webs of the seven exterior quills being of this color, while the shafts are in some specimens pure white throughout; the latter, however, is by no means usually the case, but, on the contrary, decidedly exceptional. In the Chilian examples, of which there are three adult males, the black at the base of the primaries, which in the Eastern form is wholly concealed by the overlying primary-coverts, extends as far as the sinuation of the edge of the quills, the white being thus restricted to only a little more than half the length of the quills from the ends of the coverts. Only six, instead of seven, of the quills have white on the outer webs; the shafts are black throughout, while the black on the inner web is increased in proportion with that on the outer.

A careful measurement of the whole series gives the following result:

Eastern specimens.

Wing, 3.45–3.65; tail, 2.45–2.70; tarsus, 1.05–1.12.

Western specimens.

Wing, 3.60–3.80; tail, 2.55–2.70; tarsus, 1.05–1.15.*

I am not able to discover any tangible differences between the females of the two races beyond the larger size of the Chilian examples, the

* The mimimum is represented by the specimen from Bogota, except in regard to the tarsus, which is shortest in a Chilian example.

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measurements of the two series comparing as follows, there being three specimens of each in the collection:

Eastern specimens

.Wing, 3.10–3.35; tail, 2.55; tarsus, 1.05–1.10.

Chilian examples

Wing, 3.20–3.25; tail, 2.50–2.70; tarsus, 1.08–1.12.

Following is the principal synonymy of the species:

LICHENOPS PERSPICILLATUS.

a. perspicillatus.

Le Clignot, ou Traquet à lunette, BUFF., Hist. Nat. Ois. V, 1806, 234.
Spectacle Warbler, LATH., Synop. II, 2, 1784, 452, No. 50.
Motacilla perspicillata, GMEL., S. N. I, 1788, 933 (quotes Buff. & Lath., ll. cc.).
Sylvia perspicillata, LATH., Ind. Orn. II, 1790, 524.
Œnanthe perspicillata, VIEILL., Nouv. Dict. XXI, 1818, 433 (Paraguay).
Ada perspicillata, D'ORB., Voy. Ois. 1839, 339 (Bolivia).
Lichenops perspicillata, DARWIN, Zool. Beag. III, 1841, 51, 52, pl. 9 (La Plata).—BONAP., Consp. I, 1850, 194 (part; La Plata).—CABAN. & HEINE, Mus. Hein. II, 1859, 47 (Brazil).—SCL., Catal. 1862, 203, No. 1239 (S. Brazil; Bolivia).—SCL. & SALV., P. Z. S. 1858, 141 (Buneos Ayres).—HUDSON, P. Z. S. 1869, 432 (do.).—STERNBERG, J. f. O. 1869, 262 (do.).—DURNF., Ibis, 1878, 60 (do.; descr. nest and eggs).
Fluvicola perspicillata, D'ORB. & LAFR., Mag. de Zool. 1837, 58.—HARTL., Ind. Azara, 1847, 12, 15.
Suiriri chorreado, AZARA, Apunt. III, 1805, 453, No. 182.
Muscicapa nigricans, VIEILL., Nouv. Dict. XXI, 1818, 454 (Paraguay; ex Vieill., l. c.); Enc. Méth. 1823, 828.
Elainea nigricans, GRAY, Gen. I, 1849, 251.
Perspicilla leucoptera, SWAINSON, Jardine's Nat. Libr. X, Flycatchers, 1838, 106, pl. 9 (quotes "Azara, III, 453").
Lichenops erythroptera, GOULD, Zool. Beag. III, 1841, 51, 52, pl. 9 (banks of the Plata; quotes "Swainson's Nat. Libr. X, p. 106").
Ada commersoni, LESS., Traité, I, 1831, 388 (= ♂ ad.; Paraguay).

β. andinus.

"Lichenops perspicillatus," AUCT. (ex Chili).

2.—DACNIS PULCHERRIMA, β. AUREINUCHA.

Dacnis pulcherrima, β. aureinucha, RIDGW. MS.

CH.—Wing, 2.55; tail, 1.60; bill, from nostril, .43; tarsus, .60; middle toe, .50. Similar to *D. pulcherrima*, but bill much longer and less conical; the nuchal crescent deep golden orange, instead of straw-yellow; the chin and throat dull gray, instead of deep black.

Head (except underneath), anterior portion and sides of back, scapulars, and upper tail-coverts deep velvety black; wing-coverts dark ultramarine blue; remiges and rectrices black, edged with dark blue; inner webs of two outer rectrices with a large terminal patch of white.

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Middle of the back (longitudinally), whole rump, and entire lower parts pale grayish buff, the abdomen and crissum whitish, the jugulum clearer buff, and the rump decidedly "opalescent." Chin and throat dull gray. Nape crossed by a large crescentic patch of deep golden orange, altogether different in color from the jugulum.

The bill of this race is so very different in form from that of typical *D. pulcherrima*, and more especially from that of the other *Dacni*, as to almost refer it to another genus.

The type-specimen is from Ecuador, and was received from Mr. Bernardo Thiel, through my friend Mr. José C. Zeledon, of Costa Rica.

The differences between this species and its nearest relative, *D. pulcherrima*, may be more precisely expressed as follows:

a. PULCHERRIMA.—Nape bright straw-yellow, not conspicuously different from the color of the jugulum; throat deep black, abruptly contrasted with the buff of the jugulum. Bill moderately elongated, measuring, from the nostril, .30–.37, along the culmen, .45–50. Wing, 2.60–2.75; tail, 1.65–1.80.—*Hab.*, New Granada to Eastern Peru.*

β. AUREINUCHA.—Nape deep golden orange, totally different in color from the jugulum; throat dull grayish, not abruptly contrasted with the color of the jugulum. Bill much elongated, measuring, from the nostril, .43, along the culmen, .70. Wing, 2.55; tail, 1.60.—*Hab.*, Ecuador.

3.—PARUS RUFESCENS, β. NEGLECTUS.

Parus rufescens, β. neglectus, RIDGW. MS.

Ch.—Similar to typical *rufescens*, but sides grayish, only slightly tinged with rusty, instead of wholly bright chestnut-rufous, or rust-red.

HAB.—Coast of California.

All of the many Californian specimens of this species which have come under my notice agree in the above characters, by which they may be readily distinguished from more northern examples. The typical race extends at least as far south as the Columbia River, Mr. Henshaw having the past summer obtained it along that stream in Northern Oregon. The specimens which he secured show no approach to the Californian form, being quite indistinguishable from Sitkan examples. So far as I have been able to discover, the difference, so far as coloration is concerned, consists solely in that indicated above—the entire sides in true *rufescens* being bright rust-red, or chestnut-rufous, quite as uniform and continuous as that of the back, but lighter. The bill is also decidedly more slender.

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* Five specimens measured. The principal synonymy of the typical race is as follows:

DACNIS PULCHERRIMA, *a.* PULCHERRIMA.

Dacnis pulcherrima, SCL., Rev. et Mag. Zool. Oct. 1853, 479 (New Granada); P. Z. S. 1854, 252 (do.); 1855, 84, 137; Catal. 1861, 51, No. 315, pl. 8 (New Granada); Ibis, 1863, 316 (Bogota; monographic).—CASS., Pr. Philad. Acad. 1864, 270.—SCL. & SALV., Nom. Neotr., 1873, 16, No. 9 (Columbia).—BOUC., Cat. Av. 1876, 239, No. 7430.

Nemosia torquata, DU BUS, Bull. Ac. Brux. XXII, 1855, 155.

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The principal synonymy of each of the two forms of this species is as follows:

PARUS RUFESCENS.

a. rufescens.

Parus rufescens, TOWNS., Jour. Philad. Acad. 1837, 190 (Columbia River).—AUD., Orn. Biog. IV, 1838, 371, pl. 353; Synop. 1839, 80; B. Am. II, 1841, 158, pl. 129.—BAIRD, B. N. Am. 1858, 394 (part); Cat. N. Am. B. 1859, No. 295; Review, 1864, 83 (part).—COOP. & SUCKL., Pacific R. R. Rep. XII, ii, 1860, 194 (Washington Terr.).—SCL., Catal. 1861, 14, No. 86 (Ft. Steilacoom).—DALL & BANNIST., Tr. Chicago Acad. I, 1869, 280 (Sitka).—COOPER, Am. Nat. 1869, 75 (Montana); Orn. Cal. I, 1870, 47 (part).—COUES, Key, 1872, 81 (part); Check List, 1873, No. 34; B. N. W. 1874, 22 (part).

Pœcile rufescens, BONAP., Consp. I, 1850, 230.

Parus "sitchensis, KITTL." (Gray, Hand-l. I, p. 232).

β. neglectus.

'Parus rufescens," GAMB., Pr. Philad. Acad. 1847, 155 (Monterey, Cal.; abundant).—HEERM., Jour. Philad. Acad. II, 1852, 364 (near San Francisco, June); Pacific R. R. Rep. X, 1859, pt. vi, 42 (California).—CASS., Illustr. B. Cal. Tex. etc. 1853, 18 (part).—BAIRD, B. N. Am. 1858, 394 (part; specs. from California); Review, 1864, 83 (part).—COOPER, Orn. Cal. I, 1870, 47 (part).—BREWST., Bull. Nutt. Orn. Club, Jan. 1878, 20 (descr. young).

A GENERAL CATALOGUE OF THE BIRDS NOTED FROM THE ISLANDS OF THE LESSER ANTILLES VISITED BY MR. FRED. A. OBER; WITH A TABLE SHOWING THEIR DISTRIBUTION, AND THOSE FOUND IN THE UNITED STATES.

By GEORGE N. LAWRENCE.

	Birds of the Lesser Antilles.	Barbuda.	Antigua.	Guadeloupe.	Dominica.	Martinique.	St. Vincent.	Grenada.	United States.
1	Turdus nigrirostris, Lawr	....	....	....	....	....	+	+	....
2	Turdus caribbæus, Lawr	....	....	....	....	....	....	+	....
3	Turdus ?	....	....	....	+	....	....	....	....
4	Margarops herminieri (Lafr.)	....	....	+	+	+	+	....	....
5	Margarops densirostris (Vieill.)	....	+	+	+	+	....	....	....
6	Margarops montanus (Vieill.)	....	....	+	+	+	+	....	....
7	Ramphocinclus brachyurus (Vieill.)	....	....	....	....	+	....	....	....
8	Cinclocerthia ruficauda, Gould	+	....	+	+	....	+	....	....
9	Cinclocerthia gutturalis, Lafr.	....	....	....	....	+	....	....	....
10	Mimus gilvus, Vieill	....	....	....	....	....	+	+	....
11	Myiadestes genibarbis, Sw	....	....	....	+	+	....	....	....
12	Myiadestes sibilans, Lawr	....	....	....	....	....	+	....	....
13	Thryothorus rufescens, Lawr	....	....	+	+	....	....	....	....
14	Thryothorus musicus, Lawr	....	....	....	....	....	+	....	....
15	Thryothorus grenadensis, Lawr	....	....	....	....	....	....	+	....
16	Thryothorus martinicensis, Scl	....	....	....	....	+	....	....	....
17	Siurus nævius (Bodd.)	....	+	+	+	....	....	....	+
18	Siurus motacilla (Vieill.)	....	+	....	....	....	....	....	+
19	Dendrœca virens (Gm.)	....	....	....	+	....	....	....	+
20	Dendrœca plumbea, Lawr	....	....	+	+	....	....	....	....
21	Dendrœca petechia var. ruficapilla (Gm.)	+	+	....	....	....	....	....	....
22	Dendrœca petechia var. melanoptera, Lawr	....	....	+	+	....	....	....	....
23	Dendrœca rufigula, Baird	....	....	....	....	+	....	....	....
24	Leucopeza bishopi, Lawr	....	....	....	....	....	+	....	....
25	Setophaga ruticilla (Linn.)	....	+	+	+	+	+	+	+
26	Vireosylvia calidris (Linn.)	....	+	....	....	....	....	....	....
27	Vireosylvia calidris var. dominicana, Lawr	....	....	+	+	+	+	+	....

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A Catalogue of the Birds noted from the Islands of the Lesser Antilles, &c.—Continued.

	Birds of the Lesser Antilles.	Barbuda.	Antigua.	Guadeloupe.	Dominica.	Martinique.	St. Vincent.	Grenada.	United States.
28	Progne dominicensis (Gm.)	....	....	....	+	+	+	+	....
29	Hirundo horreorum, Barton	....	....	+	....	....	....	....	....
30	Certhiola dominicana, Taylor	+	+	+	+	....	....	....	....
31	Certhiola saccharina, Lawr	....	....	....	....	....	+	....	....
32	Certhiola atrata, Lawr	....	....	....	....	....	+	+	....
33	Certhiola martinicana, Reich	....	....	....	....	+	....	....	....
34	Euphonia flavifrons (Sparm.)	....	....	+	+	+	+	+	....
35	Calliste versicolor, Lawr	....	....	....	....	....	+	+	....
36	Saltator guadeloupensis, Lafr	....	....	+	+	+	....	....	....
37	Loxigilla noctis (Linn.)	+	+	+	+	+	+	+	....
38	Phonipara bicolor (Linn.)	+	+	+	+	+	+	+	....
39	Quiscalus luminosus, Lawr	....	....	....	....	....	+	+	....
40	Quiscalus inflexirostris, Sw	....	....	....	....	+	....	....	....
41	Quiscalus guadeloupensis, Lawr	....	....	+	....	....	....	....	....
42	Icterus bonana (Linn.)	....	....	....	....	+	....	....	....
43	Elainea martinica (Linn.)	....	....	+	+	+	+	+	....
44	Myiarchus oberi, Lawr	+	....	....	+	....	+	+	....
45	Myiarchus sclateri, Lawr	....	....	....	....	+	....	....	....
46	Blacicus brunneicapillus, Lawr	....	....	....	+	....	....	....	....
47	Tyrannus rostratus, Scl	+	+	....	+	+	+	+	....
48	Tyrannus melancholicus, Vieill	....	....	....	....	....	....	+	....
49	Glaucis hirsutus (Gm.)	....	....	....	....	....	....	+	....
50	Eulampis jugularis (Linn.)	....	....	+	+	+	+	....	....
51	Eulampis holosericeus (Linn.)	+	+	+	+	+	+	+	....
52	Thalurania wagleri (Less.)	....	....	....	+	....	....	....	....
53	Orthorhynchus exilis (Gm.)	+	+	+	+	+	....	....	....
54	Orthorhynchus ornatus, Gould	....	....	....	....	....	+	....	....
55	Orthorhynchus cristatus (Linn.)	....	....	....	....	....	....	+	....
56	Chætura dominicana, Lawr	....	....	....	+	....	....	....	....
57	Chætura sp.?	....	....	....	....	+	+	....	....
58	Chætura sp.?	....	....	....	....	....	....	+	....
59	Swift sp.?	....	....	....	+	....	....	....	....
60	Cypseloides niger (Gm.)	....	....	+	....	....	....	....	....
61	Melanerpes l'herminieri (Less.)	....	....	+	....	....	....	....	....
62	Ceryle alcyon (Linn.)	....	....	+	+	+	+	+	....
63	Ceryle torquata (Linn.)	....	....	+	....	....	....	....	....
64	Coccyzus minor (Gm.)	+	+	+	+	+	+	+	+
65	Crotophaga ani, Linn	....	....	....	....	....	+	+	....
66	Chrysotis augusta (Vig.)	....	....	....	+	....	....	....	....
67	Chrysotis guildingi (Vig.)	....	....	....	....	....	+	....	....
68	Parrot sp.?	....	....	....	+	....	....	....	....
69	Strix flammea var. nigrescens, Lawr	....	....	....	+	....	+	+	....
70	Speotyto amaura, Lawr	....	+	....	....	....	....	....	....
71	Pandion haliætus (Linn.)	....	+	....	+	....	+	+	+
72	Buteo pennsylvanicus (Wils.)	....	+	....	....	....	+	+	+
73	Uribitinga anthracina (Nitzsch.)?	....	....	....	....	....	+	....	....
74	Falco communis var. anatum, Bp.?	+	+	....	....	....	....	....	+
75	Tinnunculus sparverius var. antillarum (Gm.)	+	+	+	+	+	....	+	....
76	Fregata aquila (Linn.)	+	+	....	+	+	+	+	+
77	Phæthon æthereus (Linn.)	....	....	+	....	....	+	+	....
78	Phæthon flavirostris, Brandt	+	....	....	+	+	....	....	+
79	Pelecanus fuscus (Linn.)	+	+	....	+	+	+	+	+
80	Sula fiber (Linn.)	....	....	....	....	....	....	+	+
81	Ardea herodias, Linn	+	+	....	....	+	+	+	+
82	Herodias egretta (Gm.)?	+	....	....	....	....	....	....	+
83	Garzetta candidissima (Gm.)	....	+	....	+	....	+	+	+
84	Florida cærulea (Linn.)	....	+	....	+	....	+	+	+
85	Butorides virescens (Linn.)	+	+	+	+	+	+	+	+
86	Nyctiardea violacea (Linn.)	....	....	+	....	....	....	+	+
87	Platalea ajaja (Linn.)	....	....	....	....	....	....	+	+
88	Dafila bahamensis (Linn.)	....	+	+	....	....	....	....	....
89	Clangula glaucion (Linn.)	+	....	....	....	....	....	....	+
90	Columba corensis, Gm.	....	....	+	+	+	+	+	....
91	Columba leucocephala, Linn.	+	+	....	....	....	....	....	+
92	Zenaida martinicana, Bp	+	+	+	+	+	+	+	....
93	Chamæpelia passerina (Linn.)	+	+	+	+	+	+	+	+
94	Geotrygon montana (Linn.)	....	....	....	+	+	+	+	+
95	Geotrygon mystacea (Temm.)	....	....	+	....	....	....	....	....
96	Numidia meleagris (Linn.)	+	....	....	....	....	....	....	....
97	Ortyx virginianus (Linn.)	....	+	....	....	....	....	....	+
98	Rallus crepitans, Gm.	+	+	+	....	....	....	....	+
99	Porzana?	....	....	....	....	....	....	+	....
100	Porphyrio martinicus (Linn.)	....	....	....	+	....	+	....	+
101	Gallinula galeata (Licht.)	....	....	+	....	....	....	+	+
102	Fulica?	+	+	....	....	....	....	+	+
103	Squatarola helvetica (Linn.)	....	....	....	....	....	+	....	+

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A Catalogue of the Birds noted from the Islands of the Lesser Antilles, &c.—Continued.

	Birds of the Lesser Antilles.	Barbuda.	Antigua.	Guadeloupe.	Dominica.	Martinique.	St. Vincent.	Grenada.	United States.
104	Charadrius virginicus, Borkh.	+	+	+	+	....	+	+	+
105	Ægialitis semipalmata (Bp.)	+	....	+	....	....	+	....	+
106	Strepsilas interpres (Linn.)	....	....	....	+	....	+	....	+
107	Himantopus nigricollis (Vieill.)	+	+	....	....	....	+	....	+
108	Gallinago wilsoni (Temm.)	+	+	....	....	....	+	....	+
109	Tringa minutilla, Vieill.	....	....	....	....	....	+	....	+
110	Tringa maculata (Vieill.)	....	....	+	....	....	....	....	+
111	Calidris arenaria (Linn.)	....	....	....	....	....	+	....	+
112	Ereunetes petrificatus (Ill.)	+	+	+	+	....	....	....	+
113	Symphemia semipalmata (Gm.)	+	+	....	....	....	....	....	+
114	Gambetta flavipes (Gm.)	+	....	....	....	....	+	....	+
115	Gambetta melanoleuca (Gm.)	....	+	....	....	....	....	....	+
116	Rhyacophilus solitarius (Wils.)	+	+	+	....	....	....	....	+
117	Tringoides macularius (Linn.)	....	....	....	+	+	+	+	+
118	Numenius longirostris (Wils.)	....	....	....	....	....	+	....	+
119	Numenius hudsonicus (Lath.)	+	+	....	....	....	....	+	+
120	Anous stolidus (Linn.)	....	....	....	+	....	....	+	+
121	Sterna maxima, Bodd.	+	+	+	....	....	+	+	+
122	Sterna dougalli, Mont.	....	+	....	+	+	....	+	+
123	Sterna antillarum (Less.)	....	....	....	+	....	....	....	+
124	Sterna fuliginosa (Gm.)	....	....	+	+	....	....	+	+
125	Sterna anæstheta, Scop.	....	....	....	+	....	....	....	+
126	Larus atricilla (Linn.)	+	+	+	....	....	....	+	+
127	Æstrelata?	....	....	....	+	....	....	....	....
128	Podilymbus podiceps (Linn.)?	+	....	....	....	....	+	+	+

The separate catalogues comprised in the above general one are all published in the "Proceedings of the United States National Museum," Washington, Volume I, that of the Birds of Dominica occupying pp. 46–69; that of St. Vincent, pp. 185–198; those of Antigua and Barbuda, pp. 232–242; that of Grenada, pp. 265–278; that of Martinique, pp. 349–360; that of Guadeloupe, pp. 449–462.

NEW YORK, *March* 20, 1879.

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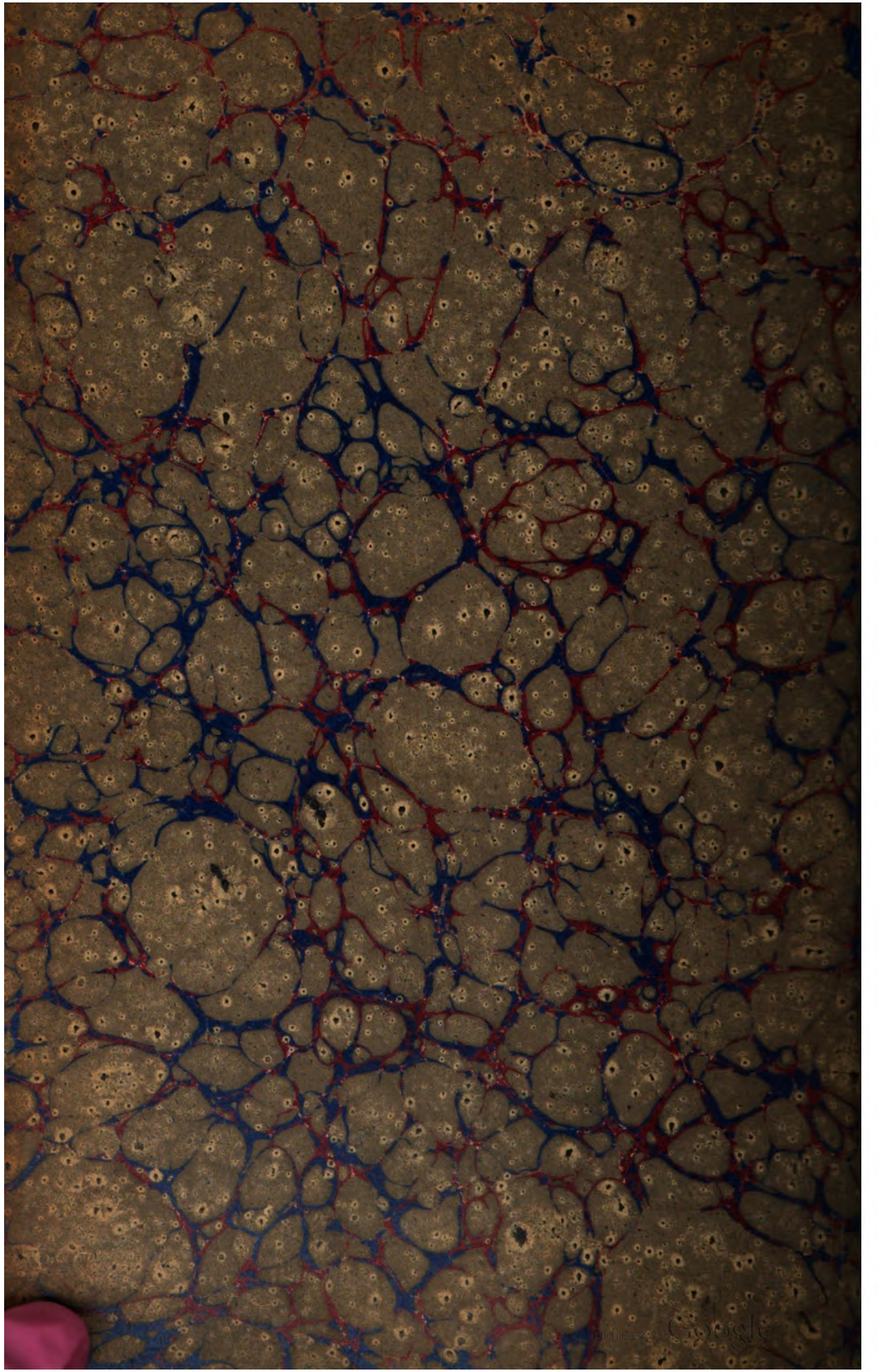
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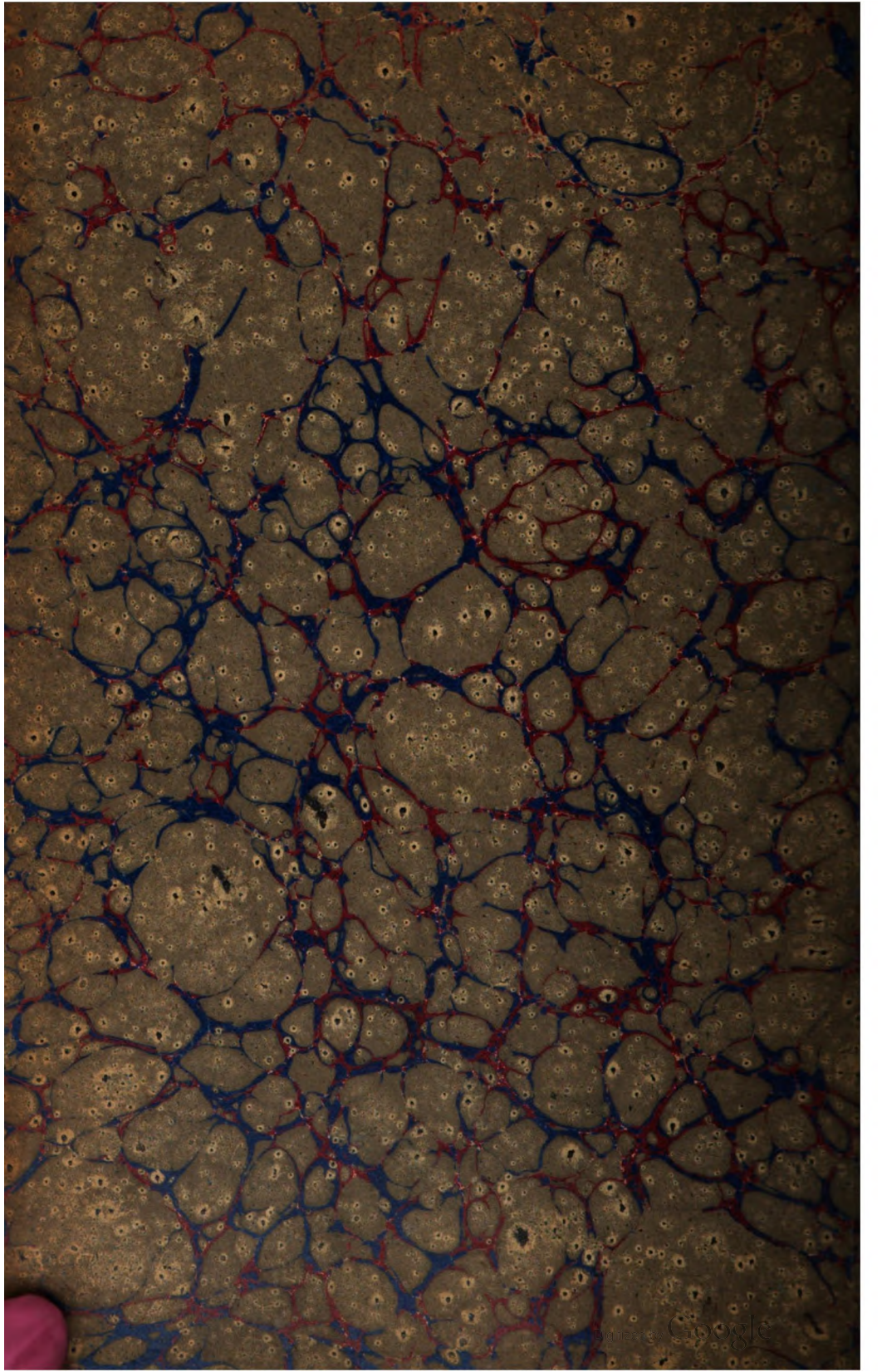
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